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# ELECTRICAL REVIEW

**and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT**

Vol. 70—No. 18. CHICAGO, SATURDAY, MAY 5, 1917. PAGE 729

## *Itemizing Cable Construction Costs*

IN A recent commission hearing considerable time was devoted to a discussion of the cost of underground cable construction by a central station defending its rates. Out of the mass of figures brought to light an interesting and important lesson springs. That is the necessity for specifying just what one means in setting forth engineering cost data of this character. To say that it costs on the average so many dollars a mile to lay No. 00, three-conductor cable proves to be a mere generality, in the face of the detailed analysis required in getting at rock-bottom expense units. Qualification of the data are in reality as important as the exercise of judgment in the use of formulae.

In the case of cable construction there are many variants which are capable of influencing cost. The expense cited may include a cable laid, with racking in the manholes, joints and allowance for waste. Here is where a discrepancy often arises between the cable invoices and the records of cable laid. Care on the part of the engineers in charge of construction will make clear the difference between unit cost calculated on total quantities purchased and that based on actual lengths drawn into the ducts. Again, the cost of capping may or may not be included in the larger figure. For a 0000, three-conductor cable, designed for 13,000-volt service, the cost of capping may run from $8.00 per cap upward, and the cost of capping smaller cable may run at the rate of half the jointing expense, per joint, in a representative case.

Do the unit costs which the central-station manager may quote include allowance for the return of reels, and are miscellaneous costs covered? Credits for material returned should be deducted in itemizing cable costs, and the precise scope of work included known before such data are offered for cross-examination. Whether a particular job runs high or low depends in some degree upon the amount of preparation required in the ducts before drawing in. Uniform costs in cable contracts seldom cover much except drawing-in and jointing. Miscellaneous costs may vary in a single company from one to twelve per cent of the cable manufacturer's cost, and they may require greater or less amounts of excavation, rodding and tagging. Preparation for tests is still another item of significance, and experience shows that an actual test allowance of $50.00 per mile may be entirely within reason. Some contracts specify a charge of one-half cent per foot for rodding ducts. Then a condition arises sometimes in cable work where a duct line must be put back into normal condition on account of extraneous construction work, as a subway or sewer trunk line.

These are only some of the considerations that need to be taken into account in getting at the fairly accurate cost of cable construction work in any one company. Engineers who have worked in this field know well how many uncertainties there are bound to be in handling construction below the surface of the ground, and if they will each "do their bit" in maintaining detailed field sheets in such form that they can be analyzed effectively prior to the presentation of unit-cost testimony, the itemization of costs in this important branch of electrical distribution will be greatly facilitated.

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## *A Step Backward In Idaho*

THE action of the State of Idaho in removing publicly owned municipal utilities from the jurisdiction of the Public Utilities Commission can only be regarded as a step backward, a step probably promoted by those advocates of municipal ownership who fear the comparison incident to the operation of public and private utilities under the same restrictions and requirements. It has often been demonstrated that municipally owned utilities are in quite as much need of regulation as privately owned utilities, and in their ranks there are just as likely to be examples of discrimination in rates, poor service and account-keeping that defies the ability of the most expert auditor in determining the financial condition of the plant.

Municipal utilities should be required to use the same standard methods of keeping accounts as private utilities; their patrons should have the same opportunity of appeal against poor service or unjust rates; extensions should be subject to the same regulations; inspection and the application of safety and service rules should all be upon the same basis. It is not the sole object of regulation to prevent corporations from milking undue profits from a community; and in nearly

every other respect the municipally owned utility can be as much benefited by the supervision of a state commission as can the privately owned utility. If both classes of utilities are operated under the same rules and the same supervision, a better opportunity for making a comparison of the advantages and disadvantages of private and public ownership would be afforded than has yet been available, and perhaps this question could be satisfactorily settled upon its real merits.

Still another reason for control of municipal utilities by the state commissions is found in the question of competition. One of the objects of regulatory laws is to prevent unwarranted competition in a field of natural monopoly. Where such competition is always in potential existence, as it will now be in Idaho, there is less security for investments in utility properties, and consequently a higher rate of return is essential to invite the necessary capital to finance extensions or promote new enterprises. This is the price which the people of the state must pay for the privilege, of doubtful value, of being able at any time to start a competitive municipal utility, rather than depend upon the Utilities Commission to secure good service at fair rates.

From every point of view it is an advantage to leave municipally owned utilities under the jurisdiction of the Commission.

## *The Planting Line to Support the Firing Line*

WITHIN the next two or three weeks substation and power-plant operators whose daily work is situated in localities where the soil is favorable to vegetable cultivation can be of real service to their country in many cases if instead of devoting their spare time to lawns and flower beds around the premises, they will plant beans, tomatoes, corn or other useful crops on a small scale or on a larger one as conditions permit. Without decrying the benefits of a handsome substation lawn or of an attractive flower bed along the borders of the station wall, let everyone who can do his bit in the prosaic but very important way above outlined.

The Doherty central-station organization in New York City has pointed the way by supplying seeds and other necessaries to its operators in outlying communities in Connecticut and elsewhere, and here is surely a way in which one of the most vital problems of the great war can be attacked. With a little ingenuity arrangements can easily be made for supplying the necessary water from the plant to a useful little garden on the premises, and we are sure that prompt encouragement by utility managers will find a ready and a patriotic response among operating men. It cannot be said too often that every pound of food which can be raised locally releases an equal quantity for service at the front, and every stroke of the hoe will help to win the war.

## *The Holding Company in Rate Cases*

THE existence of the holding company, which every year occupies a position of greater importance in the operation of public utilities, is by many regarded as a great advantage from the standpoints of better service, easier financing, etc., although by some others it has been characterized as an undesirable feature. The holding company can provide for its small subsidiary engineering talent of a grade that would hardly be obtainable by the small concern otherwise, and it offers facilities for marketing securities to provide for extensions of plant which are either entirely lacking or coupled with extra expense in the case of the independent concern. These possibilities, along with other advantages, have encouraged the growth of holding companies, into whose circles more and more of the smaller operating companies are continually being drawn.

In dealings with state utility commissions the holding company has frequently occupied a prominent part, and such corporations have often received the closest scrutiny and widest investigation at the hands of the state commissioners. At times their existence and operations have seemed to cause the commissioners much anxiety and trouble, and the attitude taken does not seem to be justifiable. Just why this should be the case is not entirely clear.

A rate case or any other type of case should be conducted and decided without regard to the personality of the owners of the securities which are involved in the case. If a rate determination is based upon a valuation of the property, it should be immaterial whether stock ownership is vested in local individuals or in a distant corporation. And if an operating charge is listed for engineering advice, the only concern of the investigators should be as to whether the service rendered is commensurate with the charge. If the holding company acts as a purchasing agent, again the important point is as to whether fair prices are being paid for materials.

What the history of the holding company may have been, what the magnitude of its present or past profits, how involved the ownership of securities may be, have no bearing upon the questions usually involved in commission regulation. The quality of service, the efficiency of management, the reasonableness of operating expenses, and the amount of the interest return which should be allowed for the use of property devoted to the business—these are the features upon which the attention of the regulatory body should be focused; the identity of the owners should be a matter of indifference and should in no way affect the decision handed down.

As already pointed out, the holding company is becoming more and more a factor in the public utility field, and it is therefore important that public service commissions in performing their functions should confine their activities to only the features which come under their jurisdiction.

# HAPPENINGS IN THE INDUSTRY

***Program for N. E. L. A. New York Convention---Report of Illinois New-Business Convention---Annual Convention of the Southwestern Electrical and Gas Association---Industrial Applications of Electricity***

## PROGRAM FOR NATIONAL ELECTRIC LIGHT CONVENTION.

**Special Annual Meeting to Be Held in New York, May 9 and 10—Mobilization to Be Discussed.**

Plans have virtually been completed for the special meeting of the National Electric Light Association, to be held in lieu of the usual form of annual convention, which is to be held May 9 and 10 at 29 West 39th Street, New York, N. Y. The first day will be devoted to a general conference on National preparedness and the consideration of the part which the National Electric Light Association can take in the general scheme of military and industrial mobolization.

The tentative program for the various sessions is as follows:

WEDNESDAY, MAY 9, 10 A. M.

President's address; appointment of committee on President's address; secretary's report; report of Public Policy Committee; address by Howard E. Coffin; addresses by some four to six prominent Association members.

WEDNESDAY, MAY 9, 2:30 P. M.

General discussion on morning's addresses, and formulation of definite recommendations to member companies for the conduct of their affairs in relation to the Government's plans for raising military forces and mobilizing the nation's industries.

THURSDAY, MAY 10, 10 A. M.

Treasurer's report; appointment or election of special committees; election of nominating committee; reports of Committee on Constitution and By-Laws; Committee on Doherty and Billings prizes; Committee on Memorials; Committee on Resolutions; Committee on Nominations for National Sections; reports of all National General Committees received by title only; unfinished business.

THURSDAY, MAY 10, 2:30 P. M.

General and Executive session; report of Committee on Constitution and By-Laws; report of National Nominating Committee; elections; report of Membership Committee; report of Committee on Safety Rules; report of Exhibition Committee; any other reports and unfinished business.

THURSDAY, MAY 10, 2:30 P. M.

Parallel executive and general meetings of all National sections for nominations, elections and reading of reports by title only.

FRIDAY, MAY 11, 10 A. M.

Parallel national section meetings for unfinished business if desired by section chairmen.

THURSDAY AND FRIDAY.

Section meetings may be conducted as desired by their respective chairmen. Papers may be read by title if desired and time permits.

## PROGRAM FOR OHIO NEW-BUSINESS COMMITTEE MEETING.

**Important Commercial Topics to Be Discussed at Youngstown Meeting, May 16.**

A meeting of the New-Business Co-Operation Committee of the Ohio Electric Light Association will be held at the Hotel Ohio, Youngstown, O., on May 16. The address of welcome will be delivered by R. T. Sullivan, general manager of the Mahoning-Shenango Railway & Light Company, and at the luncheon there will be an address by Charles A. Leedy. At the conclusion of the program of papers there will be an inspection trip to the Lowellville generating plant of the Youngstown Company.

The following papers will be presented: "Promotion of Appliance Sales," by C. H. Felker, Columbus Railway, Power & Light Company; "The Sale of Company Stock to Employees and Customers," by T. O. Kennedy, general manager of the Massillon Electric & Gas Company; "The Electric Furnace," by C. I. Crippen, Mahoning-Shenango Railway & Light Company, and a general discussion of "What is Being Done in Sales Departments to Help Overcome Increased Cost.—Has Increase in Rates Been Considered?"

J. E. North, of the Springfield (O.) Light, Heat & Power Company is chairman of the Committee, and C. E. Yacoll, of the Mahoning-Shenango Railway & Light Company, Youngstown, O., has charge of reservations for the meeting.

## SALES PROBLEMS THE CHIEF TOPICS AT ILLINOIS NEW-BUSINESS MEETING.

**New-Business Committee of Illinois Electrical Association Holds First Convention in Peoria.**

The outstanding feature of the first meeting of the Committee on New-Business Co-operation of the Illinois State Electrical Association, held in Peoria, April 27, was a comprehensive and complete program which made the one-day's session a busy and profitable convention for the 65 representatives of central stations and manufacturers who attended. The papers presented covered a wide range of topics interesting to new-business men, the subjects including electric cooking, window lighting, merchandising of appliances, industrial electric heating and salesmanship.

SCIENTIFIC WINDOW LIGHTING.

The morning session was called to order by J. G. Learned, of the Public Service Company of Northern Illinois, Chicago, chairman of the committee, who, in his opening address, complimented those in attendance for their interest in inaugurating the organization of the committee. The first paper, entitled "Scientific Window Lighting," was presented by Norman B. Hickox, of the National X-Ray Reflector Company, Chicago, who outlined the benefits to be derived from properly designed lighting fixtures. He placed emphasis on the conformity of fixtures and lamps, pointing out that it was bad practice to change lamps in a well designed system without noting the effect on the rest of the equipment.

Discussion of the paper was made by O. R. Hogue, of the Commonwealth Edison Company, in a paper read by C. A. Griner. This pointed out in particular the necessity for good window lighting and the advertising effect for central stations that it afforded. Mr. Hickox, in discussion, stated that good results were secured in window lighting by alternating mazda type C1 and type C2 lamps. The latter lamps used alone do not bring out the orange or red rays and result in what is termed a "flat" window. Alternating lamps give "warm" rays and result in more attractive lighting.

J. G. Learned, in commenting on the window-lighting business as a central-station proposition, stated that he thought the value of the business was not appreciated and that many companies were guilty of negligence in trying to secure it. The psychological effect of the many lighting installations is bound to have the effect of making the public want more electric service.

### Financing House-Wiring Contracts.

F. H. Scheel, of the Public Service Company of Northern Illinois, read a paper on "Financing Contracts for Wiring Old Residences and Additional Wiring for Appliance Sockets in Premises of Residence Customers." This paper gave the sales value of financing contracts for unwired houses. As a merchandising problem, trial service cannot be offered, but house wiring can be sold as a commodity on easy terms and local contractors can be capitalized as house-wiring salesmen. Central-station salesmen should see to it that outlets should be provided for appliances. Much of the convenience of electric service is offset by the lack of adequate facilities for their operation. Mr. Scheel stated that he thought that in a few years campaigns for added outlets will be as popular as the present house-wiring campaigns and that it will be necessary to educate the public to providing added outlets in order to secure more general business for central-station companies. He outlined plans used by his company for conducting house-wiring campaigns and paying salesmen commissions for securing appliance outlets.

In the discussion, W. A. Giffen, of the Rockford Electric Company, discussed plans used in Rockford for financing house-wiring campaigns and he suggested that a canvass be made to ascertain the ratio of wired houses to unwired houses in Illinois.

W. P. Lyon, of the Commonwealth Edison Company, gave statistics on the methods used by the Commonwealth Edison Company in securing wiring contracts for old houses. T. D. Buckwell, Central Illinois Lighting Company, Peoria, brought up points concerning salaries of salesmen for securing house-wiring contracts. He stated that experience in Peoria had proved that the morning hours were found unproductive of house-wiring contracts and that salesmen sold appliances during those periods, spending the afternoon and evening hours to secure house-wiring business.

A paper on the "Electrification of Coal Mines" was presented by Orlin Rue, of the Central Illinois Public Service Company, Mattoon. This paper gave a general discussion of coal mining in Illinois, including points on production, methods of operation and applications of electricity in hoisting, cutting, ventilating, pumping water, operating shaker screens and locomotives. Advantages of electrical operation and illustrations of motor applications were given, together with data on power consumption and the utility of central-station service to mining operators. E. R. Elan, of the Illinois Traction System, Peoria, described the electrical equipment of a coal mine in his company's territory and gave points on the installation and operation of the electrical equipment.

### Sale and Upkeep of Electrical Merchandise.

Following luncheon the delegates listened to a chalk-talk on "Salesmanship" given by A. F. Siebert, of the Dayton, O., Insulating Die Company. In a very attractive and efficient manner Mr. Siebert analyzed the different points that go to make up good salesmanship. His talk was valuable and greatly appreciated by those in attendance.

A. C. Forest, of the Rockford Electric Company, read a paper on "Electrical Merchandise—Its Sale and Upkeep," in which it was brought out that central stations did not make enough effort to sell merchandise, that they did not take the business seriously enough. He gave the experiences of his company in starting its electric shop and commented on a number of merchandising policies that had come to his attention. E. A. Adkins, of the Commonwealth Edison Company, discussed the paper, bringing out points in addition to those given by Mr. Forest. George E. Dunn, of the Public Service Company of Northern Illinois, Oak Park, gave valuable points on the equipment of an electric shop and the display of goods, calling particular attention to good arrangement of display cases, shelving, etc. He said that for psychological reasons a store should be called a salesroom and not a display room. E. Giaciolli, of the Public Service Company of Northern Illinois, Oak Park, emphasized the point that appliances should remain sold and that the company should not forget the customer after the sale was made. He made a plea for the extensive use of appliances by salesmen in order that they may become more familiar with their operation. He closed by saying that central stations should sell electric service and not kilowatt-hours.

### Industrial Electric Heating.

L. H. Knapp, of the General Electric Company, and B. J. Tarkington, of Hodenpyl, Hardy & Company, read papers on industrial heating applications. Mr. Knapp gave a general discussion on the application of electricity to heating devices, pointing out the saving afforded on plant load-factors, simplicity of control and safety of operation. He spoke about the application of electricity to japanning and baking ovens, core ovens for foundries and other installations. A number of slides illustrating applications made by his company were shown. Mr. Tarkington gave points on the advantages, economies and uniformity of production afforded by electric heat-treating ovens. He described the results obtained from a number of brass and steel melting electric furnaces in the United States.

A paper on "Electric Cooking," which was prepared for The Electrical Review and Western Electrician, and which appears in this issue, was read in part by J. Paul Clayton, of the Central Illinois Public Service Company. Owing to the lack of time, discussion on this paper was limited.

## MANUFACTURERS OF OUTLET BOXES MEET IN NEW YORK.

### New Officers Elected at Section Meeting of Associated Manufacturers of Electrical Supplies.

The Outlet-Box Section of the Associated Manufacturers of Electrical Supplies held a meeting at the offices of the Association, 62 Cedar Street, New York City, on April 24, 1917, at 10:30 a. m. The meeting was a large and enthusiastic one, practically all members of the Section being present. The Standardization Committee of the Section submitted a memorandum covering a number of important subjects for consideration and these were taken up and discussed at length. New officers of the Section for the coming year were elected as follows:

F. W. Hall, chairman, Sprague Electric Works, New York.

H. G. Knoderer, secretary, National Metal Molding Company, Pittsburgh, Pa.

Hobart D. Betts, treasurer, Thomas & Betts Company, New York City.

New committees for the year have not as yet been named. Among other subjects, the Section has taken under consideration standard packages and methods of packing, shipping, etc.,

and a committee has been appointed to make a study of same and report at the next meeting. This is one of the activities which has lately been taken up by the Association and committees have been appointed in a number of the sections to make an extensive study of the matter with a view to uniform standardization as far as possible.

## ASSOCIATION OF TORONTO ELECTRICAL CONTRACTORS FORMED.

### Outgrowth of Monthly Meeting Held During Past Winter in Interest of Harmony.

Electrical contractors of Toronto, Canada, have formed the Toronto Electrical Contractors' Association. This is the outgrowth of the monthly dinners which have been held during the winter months. On November 22 at a dinner called together to discuss organization, a committee consisting of K. A. McIntyre (chairman), Harry Hicks and W. H. Douglas was appointed to look into the matter and report. These men decided that the contractors should first get acquainted with each other and monthly dinners were held for that purpose. At these prominent men addressed the meetings on different topics.

On March 4 an organization dinner was held when it was decided to form the Toronto Contractors' Association. Constitution and by-laws based on those of the National Electrical Contractors' Association of the United States, were adopted. Nominations were received for the various offices, the voting to take place at a meeting in May. The nominations were as follows: President K. A. McIntyre, vice-president, Harry Hicks, secretary-treasurer, W. H. Douglas.

At the organization meeting 43 contractors were present but 65 out of a possible 80 have to date signified their intention of joining the new association. The initiation fee is $25 and the yearly dues $15.

## PROGRAM FOR INDIANA NEW-BUSINESS MEETING.

### Arrangements Completed for Meeting at Ft. Wayne, Ind., June 20.

The next convention of the New-Business Committee of the Indiana Electric Light Association will be held at Ft. Wayne, Ind., Wednesday, June 20, 1917. The following papers will be presented: "Organization of New-Business Departments," by Thomas Donohue, LaFayette; "Increasing the Load-Factor of Existing Lines," by N. A. Perry, Indianapolis; and "Sales Developments of Socket Appliances," by Milton Henoch.

O. M. Booher, of the Indiana Railways & Light Company, Kokomo, Ind., is chairman of the committee.

**Statement Regarding Foreign Trade Conditions Corrected.**—In the April 14 issue of ELECTRICAL REVIEW AND WESTERN ELECTRICIAN a report was given of an address made by D. H. Kramer, head of the export department of the Century Electric Company, of St. Louis, Mo., before the St. Louis Jovian League, in which it stated that American exporters had better build a better reputation for reliable products at consistent prices than attempt to compute with low prices and inferior qualities of British and German manufacturers. This was stated incorrectly, since Mr. Kramer said that some of the British manufacturers, in their attempt to supply the cheaper electric motors which were marketed by the German manufacturers before the war, had designed motors along similar lines. He said American manufacturers should build a reputation for reliable apparatus at consistent prices rather than compete with the low prices and inferior quality motors.

## SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION HOLDS ENTHUSIASTIC MEETING.

### Patriotism and Message of Support to President Wilson Mark Annual Convention at Dallas, Tex.

The thirteenth annual convention of the Southwestern Electrical and Gas Association which was called to order by President F. R. Slater, of the Texas Power & Light Company, on Thursday morning, April 26, was one of the most enthusiastic and successful meetings in the history of the Association. The headquarters of the convention was the Adolphus Hotel, where the meetings were also held. The membership of the Association has been maintained during the past year in spite of combinations and difficult operating conditions. The attendance at the convention was unusually good, there being more than 300 delegates registered during the three days' session.

John R. Babcock, secretary to the president of the Chamber of Commerce and Manufacturers' Association, welcomed the delegates to the City of Dallas and made some interesting remarks on the splendid service the utilities were rendering the public. He cited the great inconvenience the public would experience if on getting up in the morning there was no running water, no gas for cooking, electricity for lighting, no telephone, no street car and no elevator service. He suggested the public might be made to realize this inconvenience very effectively if all of these services were cut off for even one hour of the day. Mr. Babcock spoke of the great opportunity the public utility executive has to take an active part in the commercial organization of the city in which he lives. He thus would become intimately identified with the civic affairs of the city, subscribing not only his money but his time and his personal service. He would be well paid in the satisfaction of having rendered a service to his community, and would realize from a business standpoint that it was a good investment.

President Slater in his address to the Association reviewed the activities of the Association during the past year, and with reference to the enlistment of public utility employees in the government service at this time said:

"It may develop we can render a singular service to our country by increasing our effectiveness and efficiency. That we, like other businesses, suffer losses from our ranks through enlistment of employees is undoubtedly a fact, but we do not want to let that drive us into a panic. We, like other lines of business, will have to find more efficient ways of meeting the situation, by getting more work out of those who remain, or through other means that we may be able to devise."

W. B. Tuttle, of the San Antonion Gas & Electric Company was appointed chairman of the Resolutions Committee, and with him as members of the Committee were appointed W. A. Sullivan, of Shreveport, La., and John Carpenter, of Corsicana, Texas. On the last day of the session the Resolutions Committee presented resolutions with reference to the courtesies that were extended by the citizens of Dallas and all those who had directly contributed to the success of the convention.

A committee consisting of W. B. Head, of Dallas, chairman; D. R. Locher, of Corpus Christi, and V. W. Berry, of Fort Worth, was appointed to draft a suitable telegram to the President of the United States assuring him of the support of the Southwestern Electrical and Gas Association. The following telegram was formally adopted and transmitted to the President:

"The members of the Southwestern Electrical and Gas Association, representing the street and interurban electric railway companies, gas companies, electric light and power companies and waterworks companies of the Southwest, in full convention assembled, unanimously pledge their support to the National Administration in all its war measures, and

especially in selective conscription, and tender their services and the use of their properties to the end of the defense of their country."

The Thursday afternoon and Friday morning sessions were devoted to the presentation of papers and discussions on subjects of particular interest to gas and street railway and interurban companies.

### Lignite as Fuel.

The light and power session held on Friday afternoon was presided over by A. V. Wainwright, president of the Abilene Gas & Electric Company. Professor E. P. Schoch, School of Chemistry, University of Texas, explained the desire of the state university to co-operate with the public utilities and outlined some of the work they have started. Among other things the university is investigating the use of lignite as a fuel and also water softening agencies. Speaking in behalf of the university, he said, in part:

"We believe that the use of hard water is the cause of much of the loss of the fuel energy and the cause of the still greater difficulties of having to clean boilers. We want a measure enacted by the state making it possible to have proper instructions and to give direct aid to the companies of Texas in securing properly softened water. It is an economic measure and therefore the chemical division of the university undertakes to give advice free of charge. We are now cooperating with at least two plants. They have installed settling tanks, and with the proper amount of lime and soda, which we determine upon after analysis and which can be adjusted by the workmen from our instructions and chart, the difficulties of the hard water are solved."

The university also expects to take up the briquetting of lignites and other problems just as soon as satisfactory arrangements can be made.

George H. Cushman of San Antonio asked Prof. Schoch some questions which developed the fact that a cold-water treatment was used and that aeration or stirring by means of paddles greatly facilitated settling.

### Internal Combustion Engines.

"Internal Combustion Engines" was a subject discussed by J. C. Kennedy, manager of the electric department of the Brenham Compress Oil & Manufacturing Company, Brenham, Texas. Mr. Kennedy recited his experience with steam turbines and oil engines with reference to economy in operation. At the Brenham plant they have for five months in the year a heavy load and for seven months in the year a light load. Mr. Kennedy said that he was fully convinced that any class of prime mover is a matter largely of local conditions, and each condition must be worked out according to what the man who is going to make the investment thinks is necessary to handle the situation. His experience has been that for a 200-kilowatt load or less, oil engines were cheaper, and above 200-kilowatts that the steam turbines became more economical as the load increased. They did not find it very satisfactory to work the oil engines in conjunction with the steam turbines. In the season of heavy load they use the steam turbines exclusively, and in the season of light load they use the oil engines exclusively. Although the oil engines were costlier to operate than the steam turbine during heavy load, still the steam turbine would be less efficient during the light load than the oil engines. For absolutely reliable service, depending on a single unit of any kind is not very satisfactory.

Those taking part in the discussion were G. H. Cushman, San Antonio Gas & Electric Company; D. F. Cherry, of the City of Weatherford Water, Light & Ice Company; Frank G. Frost, Houston Light & Power Company; C. B. Roberts, betterment engineer of the Stone & Webster Engineering Corporation, Dallas; J. G. Cowles, Shreveport (La.) Gas & Electric Company, and D. A. Hegarty, president of the Texas Gas & Electric Company.

With the idea of getting clearly in the minds of the central-station operators the various elements that enter into the making of proper rates and of being able to intelligently convey that information to others when the subject of rates is being discussed, two papers were presented to the convention on the subject of rates; one by H. S. Cooper, secretary of the Southwestern Electrical and Gas Association, on the "Fallacy of a Comparison of Rates," and one by H. O. Clarke, commercial manager of the Houston Light & Power Company, entitled "Justice and Equity of Wholesale Rates."

### Central-Station Extensions and Operation.

D. A. Hegarty, president of the Texas Gas & Electric Company, Houston, presided. Before starting the business of the session Mr. Hegarty announced the death from a pneumonia attack of Mark Lowd, Southwestern manager of the Stone & Webster Engineering Corporation, Dallas. Appropriate resolutions were adopted by the Association and a floral tribute sent to the family.

R. J. Irvine, general manager, San Angelo Water, Light & Power Company, then presented a paper on "Extension of Services," which is abstracted elsewhere in this issue. In the discussion of the paper in answer to a question by George H. Cushman, of San Antonio, as to the basis of extension, Mr. Irvine said that they first canvassed the territory to be served and made an estimate of the revenue to be obtained, including that from signed contracts, and that to be derived from the increase in the building of the particular section. If that estimate gave a rate of return equal to eight per cent plus depreciation, they decided that the extension should be made. For short extensions to residences the limit with them is 500 feet for five lights or over; service extensions not to exceed two blocks. D. A. Hegarty, the chairman of the meeting, suggested in some instances the commissions have set the limit beyond which they will not require the services to be extended of a return of 30 per cent on the gross receipts of the first installation.

"Economies in Central-Station Operating" was the subject of a paper by F. N. Lawton, manager of the Wichita Falls Electric Company. The discussion was participated in by G. H. Cushman, San Antonio; C. B. Roberts, Dallas; R. J. Irvine, San Angelo; Frank G. Frost, Houston; D. F. Cherry, Weatherford, and Prof. J. M. Bryant of the Texas State University.

One of the first suggested economies in brief was that a $CO_2$ recorded was important in connection with burning gas, fuel oil and coal, but perhaps especially so in burning lignite. Auxiliary hand sets were also recommended.

An economical and positive means of stopping air leaks was the next means of economy discussed. C. B. Roberts, betterment engineer of the Stone & Webster Engineering Corporation, Dallas, stated there were a number of different cements made especially for that purpose, which embody in their makeup asbestos fiber, asphaltum in its crude form, and other mixtures, which have been found very satisfactory. He stated that three years ago they applied "Neverleek" cement to all their boilers in El Paso and Southeastern Texas, and that today the boilers are intact. The cement is so constituted that it can take care of the expansion and contraction of the boiler setting, due to the rise and fall of heat. Before applying the cement to the boilers in El Paso there was a difference between the $CO_2$ in the fire and the $CO_2$ in the stack of 3.5 to 4 per cent, which was reduced to one per cent. Mr. Lawton, the author of the paper, suggested coating the entire boiler with a preparation of tar as a means of sealing the invisible air leaks.

D. F. Cherry, of the City of Weatherford Water, Light & Ice Company, said he effected a saving of about 50 per cent in his fuel bill by the installation of a damper regulator, by means of which his steam pressure did not vary more than five pounds in 24 hours.

Mr. Lawton further suggested much better results were

obtained by working the firemen only 10 hours instead of 12 hours a day. Economies were effected by making the boiler-room and engine-room more cheerful, providing shower baths, soap, water and books, and making the men feel that the boiler-room was one of the most efficient parts of the business.

The economy of cleaning the boiler tubes regularly was pointed out. Both chemical and mechanical processes are being used successfully.

### Illumination versus Raw Light.

J. G. Barrett, illuminating engineer of the Texas Power & Light Company, Dallas, made one of the most interesting and enthusiastic contributions to the program in his paper on "Illumination versus Raw Light." Mr. Barrett made some suggestions for increasing the sales along the present service lines. Among those he mentioned porch lights, sockets and plugs in the homes for electrical appliances, a light in every socket, electric lights in the public school buildings, specially lighted business districts, classified lighting, such as daylight lighting of stores generally, north sky-light lighting for ribbon and dress goods counters and so on. The object to work towards is to make the use of electric light and electrical appliances both convenient and efficient. Several questions were asked Mr. Barrett at the close of the reading of his paper.

### Election of Officers.

George W. Hill, traveling representative of the Society for Electrical Development, appeared before the Association and outlined the aims of the Society on Electrical Development. He gave the Association a great deal of valuable information concerning the work of the Society, and aroused a very considerable interest in its behalf.

The following officers were elected for the ensuing year:

President, H. C. Morris, Dallas, Texas.
First vice-president, D. A. Hegarty, Houston, Texas.
Second vice-president, W. A. Sullivan, Shreveport, La.
Third vice-president, Burr Lartin, Dallas, Texas.
Secretary, H. S. Cooper, Dallas, Texas.
Treasurer, J. B. Walker, Dallas, Texas.

The next place of meeting will be decided upon by the Executive Committee. However, it is probable that the Association will hold its next convention in Galveston, the city which has been a very popular meeting place of the Association in the past three years.

## ECONOMIC IMPORTANCE OF INDUSTRIAL APPLICATIONS OF ELECTRICITY.

### Chicago Meeting Considers Use of Electricity in Industries and Particularly Electric Furnaces.

A joint meeting was held in Chicago on April 23 by the Chicago Section, American Institute of Electrical Engineers, and the Electrical Section, Western Society of Engineers. The paper of the evening was entitled "Economic Industrial Applications of Electricity" and was presented by Norman T. Wilcox, sales manager of the Mississippi River Power Company, Keokuk, Iowa. In opening the paper, Mr. Wilcox showed that the imperative need of the times is to improve efficiencies and eliminate wastes. Our country is very prodigal of its resources and our present situation, if it arouses us to wise conservation, may prove to be beneficial in the end. Each individual must do his part to avoid duplication of effort and needless waste.

Taking up motor applications, it was demonstrated that electric drive brings about improved efficiencies and greater economy, increased output and highest quality of product. This is especially noteworthy in textile mills, where the quality has been markedly improved, which accounts largely for the great increase in electric textile drives during the last 10 years. In machine shops its benefits were shown to be very marked. Electric drive makes it possible to check the performance of particular machines or entire departments, which promotes decided economies that are not realized where no checks, such as graphic records, are used. A 10 per cent change has been noticed on the introduction or cessation of continuous records.

Central-station loads are coming to be largely power loads which make possible the generation of electricity in large and very efficient units. As compared with large numbers of small isolated plants, central-station generation effects a radical coal economy. Operation of the Keokuk plant alone saves about 1,000,000 tons of coal a year. Central-station development also makes possible steady reductions in electric rates to residence as well as power customers.

Electric vehicles furnish the possibility of valuable central-station loads tending to a marked improvement of the load-factor. Electric trucking at the Bush Terminal in Brooklyn furnishes a load of 12,000,000 kilowatt-hours a year. Electric ice-making and refrigeration are excellent loads and, especially in the South, prevent a great deal of food spoilage which would represent an enormous waste. The development of electrochemical processes is yielding numerous products of great utility that it has not been possible heretofore to produce. The electrochemical field indeed gives excellent promise of promoting efficiencies of the highest industrial value. The use of domestic electrical appliances means increased household comfort and efficiency and in the aggregate is capable of producing loads of no mean value.

The use of electric furnaces in the steel industry has received a most extraordinary impetus during the last year or so. Up to March there were 158 electric steel furnaces in use or contracted for in the United States. They are producing a much better and more uniform quality of steel and have practically replaced the crucible steel process. In 24-hour operation an energy consumption of 600 kilowatt-hours per ton of steel should suffice. Electric steel furnaces are capable of practically perfect control, which accounts largely for the uniformity of their product. They may be operated so as to keep off the central-station peak in order to command a better power rate. Mr. Wilcox touched on many details of electric furnace operation and showed that, among other things, the quality of the materials used greatly affects the cost and quality of the steel produced. Touching on other electrometallurgical processes, he mentioned the electrolytic purification of zinc which is producing a metal of very great purity. A recent development in this line is a simple and valuable process of making hard lead electrically; this is an excellent material for bearings.

General discussion of the subject was opened by George H. Jones, who referred to the rapid developments that had been made in the electrical field during recent years, all making for greater economy and comfort.

J. M. Olmsted described at some length his experience in making electric steel castings. Formerly there had been from 27 to 32 per cent of steel castings rejected after being machined; by the electric steel process these rejects had been reduced to less that 0.1 per cent, which means an enormous saving. The electric furnace produces a very uniform steel, which for gears and similar purposess has a much better bearing surface. Elastic steel castings for gear blanks are of such uniform and dense nature as to require no subsequent heat treatment, which means another great saving. Mr. Olmsted's plant has a single-phase furnace operating with very good results at an energy consumption of 550 to 575 kilowatt-hours per ton of steel melted in 24-hour service. The chief problem with the electric furnace now is that of securing electrodes, which are difficult to obtain. Electric furnace steel castings are of much higher grade than those made from converter steel.

# NEWS NOTES

**Bill for Abolition of Minimum Rates Defeated.**—A proposed amendment to the railroad commission act introduced in the California Legislature and abolishing minimum rates on gas, water and electricity was recently defeated.

**Prof. Pupin to Address Radio Engineeers.**—At a meeting of the Institute of Radio Engineers, to be held May 16 in the Engineering Society Building, 33 West Thirty-ninth Street, New York City, Prof. Michael I. Pupin, president of the Institute, will present a paper on "Iron at Radio Frequencies."

**Annual Meeting of Class D Members, N. E. L. A.**—The annual meeting of Class D members of the National Electric Light Association will be held in the Association's offices in New York on Thursday, May 10, at 12 o'clock, noon. H. G. McConnaughy, secretary, earnestly requests that all Class D members in attendance at the convention of the National Electric Light Association attend this meeting, as matters of importance will come up for attention.

**Right of Eminent Domain to Rhode Island Company.**—The Rhode Island Assembly has passed a bill which gives the eminent domain right to the Rhode Island Power Transmission Company for 10 years, subject to Supreme Court determination of necessity. The city and town councils are given jurisdiction over layouts. The measure is the result of long controversy, in which various amendments designed to limit the power and protect the public were brought forward.

**Joint Engineering Meeting at Cleveland.**—The members of the Cleveland Section, American Institute of Electrical Engineers, held a joint meeting with the Pittsburgh Section, Illuminating Engineering Society, in the Electrical League Room, Hotel Statler, Cleveland, O., on Monday evening, April 16. Ben Perris, of the National Carbon Company, and a member of the Cleveland Section, gave an interesting talk on the subject of "Illuminating Engineering in the Motion-Picture Industry."

**Power Merger at Niagara Falls Is Proposed.**—A bill has been introduced in the New York Assembly giving permission to the Niagara Falls Power Company and the Niagara Falls Hydroelectric Power Company to increase their output of electrical energy by 70,000 horsepower. The bill empowers the companies to merger and deepen the intake so that all of the diverted water will pass through one intake. It is proposed that the Public Service Commission will regulate the action of the two companies.

**Toledo Wants Next Jovian Convention.**—Tribune Marvin Hansen, at a recent meeting of the Toledo Jovian League, announced the appointment of an executive committee as follows: F. R. Coates, E. R. Kelsey, A. K. Young, Fred Bissell, Frank Knierim, W. G. Nagel, Lee Carney, Bob Winters, Earl Miller, L. Roush, Frank H. Chapman and J. J. Duck. For several weeks luncheons will be held and a number of prominent electrical men will come to the city to make preparations for a campaign to bring the next annual Jovian convention to Toledo.

**American Physical Society Holds Meeting in Washington.**—The eighty-ninth meeting of the American Physical Society was held at the Bureau of Standards, Washington, D. C., on April 20 and 21. Of the many papers presented at the three sessions that were held, over half were of electrical character or interest. At one of the sessions special consideration was given to plans presented by President Milikan of the Society for enabling the United States Government to utilize effectively the research ability represented in the Society's membership for meeting urgent demands of the present war situation.

**Joint Meeting of Societies in Portland.**—The regular monthly joint meeting of the A. I. E. E. and N. E. L. A. will be held at 8:00 p. m. in the grand ball room of the Multnomah Hotel, Portland, Ore., Tuesday evening, May 8, 1917. The meeting will be in charge of the N. E. L. A. The program will consist of the following: A paper, "Description of Chart to Determine Proper Sag for Stringing Aerial Cables and Wires," by H. H. Schoolfield; a paper, "Determination of Efficient Ground Connections for Distribution Systems," by W. C. Heston; a paper illustrated with lantern slides, "Reclamation Load on North Coast Power Company's Lines," by R. M. Boykin.

**New Steam Plant in Central Massachusetts.**—The Turner's Falls (Mass.) Power & Electric Company will soon begin the construction of a steam station, to develop 30,000 to 40,000 kilowatts, at Chicopee Center, Mass., between the Connecticut and Chicopee Rivers. The company now operates a large hydroelectric station just north of Turner's Falls and distributes energy throughout the Connecticut River valley. The new plant is an auxiliary to this and is to furnish power to the Springfield street railway and for general distribution. It is expected that the plant will be completed by July 1, 1918. Fred T. Ley & Company, Springfield, Mass., are the general contractors.

**Underwriters' Laboratories Move New York Office.**—On May 1 the New York Office of Underwriters' Laboratories were moved to the twelfth floor of the Evening Mail Building at 25 City Hall Place. In the new quarters are both the offices formerly at 135 William Street and the testing station formerly at 92 Vandam Street. The new quarters will provide increased space for the work and will be much more convenient in that the office and laboratories will be together. The New York Office now has a force of 12 inspectors engaged in the factory inspection and label service work, and a corps of electrical engineers engaged in the testing of new appliances. The office is under the direction of Dana Pierce, vice-president.

**Utility Commission to Continue Lighting-Rate Inquiry.**—The Board of Public Utility Commissioners, New Jersey, has refused the request of President Thomas N. McCarter, of the Public Service Electric Company to postpone further proceedings in ascertaining the value of the company's physical property pending the termination of the present national crisis. This request was made upon the ground that the company should not be embarrassed at this time when it desired to devote its energies to aiding the country in extending its facilities for service and protecting its property. The board says that when the value of the company's property has been learned such a motion to postpone the hearings might be entertained. The next hearing has been called on May 9.

**Organize Electrical Club of Greater New York.**—A meeting of the various concerns engaged in the electrical jobbing business in Greater New York was held at Mouquin's on April 17 for the purpose of discussing the problems and bettering the conditions of the electrical jobbing business in the Greater New York territory. The meeting was attended by 51 men, representing 42 electrical jobbing concerns, and was an enthusiastic gathering. It was unanimously decided to form an organization to be known as the Electrical Club of Greater New York and it was voted to hold a meeting each Tuesday evening for a month's time in order to perfect the organization, and after that time to hold monthly meetings. The following were elected officers: Chairman, Charles P. Scott, of the Royal-Eastern Electrical Supply Company; secretary, W. J. Kranzer, of Crannell, Nugent & Kranzer; executive committee, J. E. McClernon, of the Northwestern Electric Equipment Company; Charles B. Bentz, of Holloway, Bentz & Company; J. J. Hartt, of Hartt & Morison; C. P. La Shelle, of W. R. Ostrander & Company, and H. H. Kabat, of the Independent Electrical Supply Company.

# Electric Cooking In Small Cities

## *A Comprehensive Account of the Activities of the Central Illinois Public Service Company In Introducing Electric Cooking in 131 Small Communities*

By J. PAUL CLAYTON

*Commercial Manager, Central Illinois Public Service Company*

PRIOR to the summer of 1915 there were less than 100 electric ranges in use in the State of Illinois, according to the best information available. This was principally due to the fact that electric cooking rates were not available generally up to that time and also to the further fact that the electric range has experienced greater development within the last three years than in all the years preceding them.

There are in Illinois at this time 764 communities receiving electric service and of these only 228 have gas service available. This leaves a total of 536 communities where the only methods of cooking other than electric are by means of coal, wood, gasoline or kerosene.

During the summer of 1915 special electric cooking rates had been introduced in about 400 of the total number of communities receiving service and the real advance in electric-cooking business in Illinois dates from that time.

It is estimated that in Illinois there are 100,000 residence customers now using electric lighting service in communities where gas service is not available and who are therefore prospects for electric cooking. The average income from an electric range customer amounts to about $36 per year, so it is apparent that the total possible income to central-station companies in Illinois from electric cooking, if every such customer could be supplied, would be about $3,600,000.

In Central Illinois a very large percentage (probably 90 per cent) of the towns receiving electric service do not have gas service and the field for electric cooking in this portion of the State is therefore very great.

The prices of coal, gasoline and kerosene have increased steadily during the past two years while the cost of electrical energy for cooking has either decreased or remained the same, so that in many cases electric cooking can now be done at less actual cost than with coal, gasoline or kerosene, not to mention the work, discomfort and sometimes the danger by fire which is present in the use of coal, gasoline or kerosene.

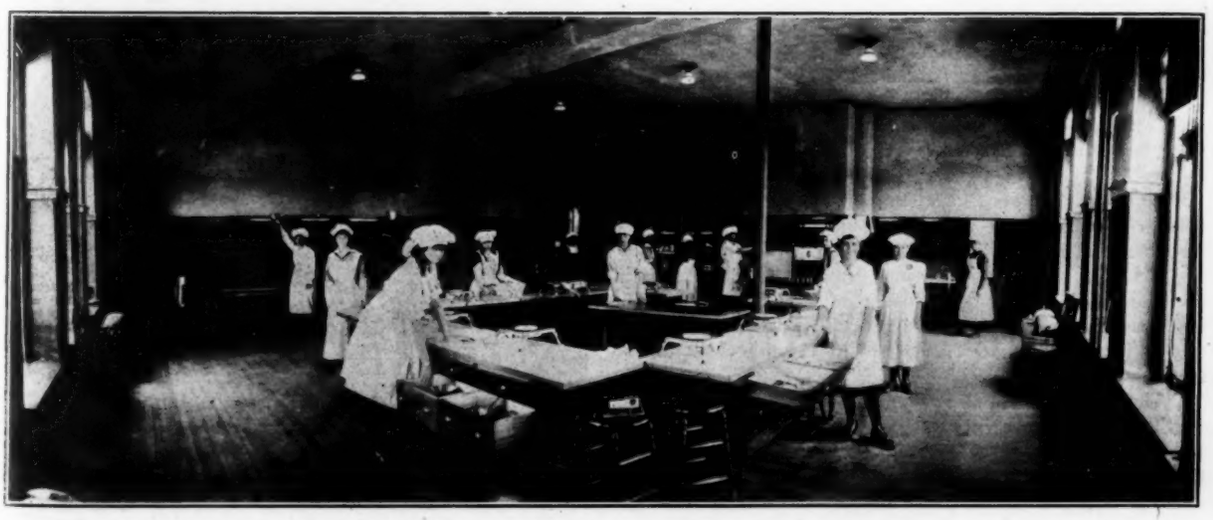
The Central Illinois Public Service Company, which supplies electric service in 131 communities in Central and Southern Illinois, commenced the introduction of electric cooking on a large scale in the summer of 1915. Only seven of the 131 communities had a supply of artificial gas available.

### Principal Methods Employed to Introduce Electric Cooking.

The principal methods used in promoting the use of electric cooking are given in the following paragraphs:

The first step was the sale of electric ranges to central-station employees in order to give them actual experience in electric cooking, which experience makes them very active salesmen.

When the campaign to introduce electric cooking was first started, it was found that a large number of the Company's employees did not really believe in electric cooking and felt its cost would be so high that only the very wealthy could afford it. A meeting of salesmen and superintendents was held and at this meeting electric-range manufacturers demonstrated their ranges and actually cooked a dinner for these men. This meeting entirely changed the feeling of these employees towards electric cooking. Special inducements were then made to secure as many employees of the Company as possible as electric cooking customers because it was found that when an employee of the Company became a cooking customer he also became a very active salesman and that the power of example in endeavoring to sell ranges was very essential to success in convincing prospective customers. When



**An Electric-Cooking Installation in the Havana High School.**

**The installation of electric-cooking equipment in the domestic-science departments of high schools is an important step in a permanent electric-range campaign. The advertising thus secured is of the greatest benefit in educating the public in electric cooking and in afterwards selling ranges in the homes of the students and their friends. After once using an electric range it is hard to go back to the use of coal, wood, gasoline, etc.**

many of the Company's employees had become electric cooking customers they were able to locate prospects during their daily work, such as meter reading, collecting, etc., which salesmen cannot locate. Experience shows that a Company cannot succeed in introducing electric cooking on a large scale unless the employees of the Company are themselves electric-cooking customers.

In most small towns the employees are personally ac-

**Cooking Demonstrations Always Attract Attention.**

quainted with a majority of the Company's customers and for this reason the power of example in this class of territory is much greater than it would be in large cities. Many employees and members of their families are often able to sell 15 or 20 ranges in a season to their own close friends, merely by the fact that the electric range occupies a considerable portion of the conversation at the various gatherings where they meet. The use of the electric range under such circumstances is promoted by actual cooking customers with much greater effect in most cases than can be done directly by a representative who may not be personally acquainted with the prospects.

The second step was demonstrations of electric cooking at church dinners, county fairs and other similar public occasions where the best representative people of the community are in attendance.

Special demonstrations in the past have been limited to the furnishing of electric ranges free for use at church dinners, county fairs and othr similar public occasions where the public could see the range in actual operation. The various prospects for electric cooking secured from the people who were in attendance at these dinners were followed up and the results have been very gratifying. After one church dinner six electric ranges were sold. In small towns the church dinners held from time to time are undoubtedly one of the very best means of popularizing and showing the electric range.

This year a number of demonstrations are being held in the Company's offices or in other public places. Sufficient experience has not yet been had with this form of demonstration to form an accurate estimate of the results which will be secured.

The third step was the offering of trial periods in the use of the electric range in the house of prospective customers where they would agree to purchase the range if it fulfilled the claim made for it.

It was found at first that many of the lighting customers were willing to purchase electric ranges if the cost of operation was reasonable or if the range would actually cook satisfactorily. Most of the prospects had never even heard that cooking could be done by electricity, except in portable utensils, such as grills, percolators, chafing dishes, etc. Other prospects felt that the cost of operation might be excessive. To meet these objections trial periods of 15 to 30 days were offered to those prospects who it was felt were in good faith and who would agree to purchase the range if the cost was reasonable and if the cooking results were satisfactory. The experience with the use of this trial period has been very satisfactory but extreme care must be used in approving trials only to those customers who are undoubtedly in good faith and whose credit is unquestioned. There are always cases where certain customers will wish to try an article first free of cost with little or no intention of purchasing, and, of course, trials under these conditions are not satisfactory and should be discouraged.

This year the use of free trial periods has been discontinued except for very exceptional cases, as it has been found that such trials are no longer necessary in towns where many ranges are in actual use. Trials are very necessary, however, during the first one or two years of any electric-range campaign as during that time the electric range is distinctly on trial and it cannot be made to succeed unless the central-station company is willing to show its own faith in electric cooking by offering trial periods.

### Ranges in Domestic-Science Schools.

The next step was the introduction of electric cooking in high-school domestic-science courses. Most of the high schools in Central Illinois have a domestic-science course and only a very small percentage of them are able to secure gas service. The other high schools were found to be cooking by means of portable gas plants, compressed gas or with gasoline. The latter methods have been quite unsatisfactory as well as dangerous.

A special campaign was started to sell electric hot plates, portable ovens and ranges to as many high schools for use in their domestic-science courses as possible, as it was felt that the advertising thus secured from these courses would be of the greatest benefit in educating the public to the use of electric cooking and in afterwards selling ranges in the homes of the students and their friends. Up to date, complete electrical cooking equipment has been placed in 15 high schools. The energy cost for the operation of this equipment has been very

**The Central Station Shcuid Display Ranges in Its Show Windows.**

reasonable as compared with other fuels and the results are very satisfactory in every case.

In two of the accompanying illustrations are shown the domestic-science class in the Havana (Ill.) Township High School, which has a complete electric-cooking equipment. This installation was one of the first secured by the Central Illinois Public Service Company. It consists of 10 single-burner hot

plates, one portable oven and one six-burner range with oven, broiler and warming shelf.

Havana is a city of 3525 population, as shown by the 1910 census, and this year the electric-cooking domestic-science course is being taken by 72 students, representing about an equal number of families. In other words, the Havana High School equipment is training all of these pupils in the use of electric cooking. It is safe to say many of them will do everything in their power to urge their families to purchase electric ranges. When they commence housekeeping themselves most of them will insist on the use of an electric range. After a person has once used an electric range it is very hard to go back to the use of coal, wood or gasoline. The immense advertising value of introducing electric cooking in domestic-science courses is thus apparent.

The next step in introducing electric cooking was the use of actual kilowatt-hour consumption data from existing customers to induce other prospects to use electric cooking.

Monthly records of the actual kilowatt-hour consumption of all of the cooking customers were compiled and the various salesmen were supplied with this information, who, in turn, used it in convincing prospects that the cost of operation under similar conditions was very reasonable. The use of these data aided materially in securing many customers and it is the real answer to the objections of prospects who fear that the cost of electric cooking is prohibitive.

The sixth step was the selling of electric ranges on deferred payments, including interior connections to overcome the high initial cost of the range.

The electric ranges have been sold, including interior wiring, on deferred payments, payable in 10 equal monthly installments. It is generally advisable to include interior wiring in the cost of the ranges as this enables a contract to be taken with a customer for a definite sum. If the cost of the interior wiring is separate the customer sometimes refuses to purchase a range simply because he feels that such cost might be excessive, especially as it is entirely beyond his control. A large cash discount on the price of ranges has been given to those who wish to pay cash.

### Kilowatt-Hour Consumption Data for Cooking Customers.

The kilowatt-hour consumption for all cooking customers

**An Installation in an Illinois Cooking School.**

served by the Central Illinois Public Service Company during the months of 1916 is shown in the accompanying table.

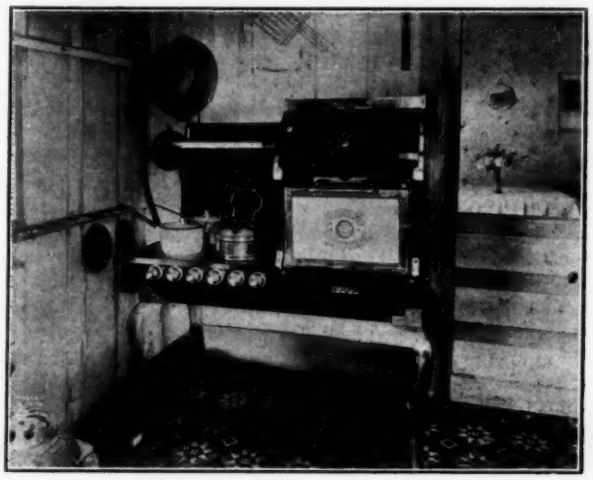
The average net bills per year and per month were computed on the Company's regular heating and cooking rate, which is as follows:

10.5 cents per kilowatt-hour for the first 10 kilowatt-hours used per month.

3 cents per kilowatt-hour for all over 10 kilowatt-hours per month.

There is a prompt-payment discount of 0.5 cent per kilowatt-hour when bills are paid on or before the tenth day of the succeeding month. There is a minimum charge of $24 per year.

Information of this kind is used constantly to secure additional cooking customers and only such information is



**An Electric Range in a Humble Residence.**

used as is obtained from the local customers where the conditions are similar and are definitely known.

KILOWATT-HOUR CONSUMPTION.

| Month, 1916. | Residence ranges. | High schools—Domestic science installation. | Cafes—Hotplates for short order work. | Cafes—Coffee urns. | Weighted average all cooking customers. |
|---|---|---|---|---|---|
| January | 70.9 | 99.0 | 229.5 | 508.5 | 107.6 |
| February | 73.7 | 100.0 | 155.6 | 490.0 | 103.0 |
| March | 61.9 | 56.0 | 131.6 | 434.4 | 89.0 |
| April | 70.4 | 54.5 | 137.3 | 372.6 | 89.6 |
| May | 68.6 | 95.0 | 176.6 | 363.6 | 85.5 |
| June | 83.3 | 50.0 | 186.3 | 373.0 | 95.5 |
| July | 99.8 | ..... | 189.5 | 389.4 | 111.8 |
| August | 101.4 | ..... | 143.9 | 347.7 | 109.2 |
| September | 104.5 | 48.0 | 181.1 | 384.8 | 113.2 |
| October | 85.7 | 72.9 | 200.4 | 400.5 | 98.0 |
| November | 75.4 | 75.1 | 139.5 | 446.7 | 88.7 |
| December | 71.0 | 83.4 | 161.8 | 389.0 | 84.5 |
| Total kw.-h. per year | 966.6 | 733.9 | 2,033.1 | 4,900.2 | 1,175.6 |
| Average net bills per year | $33.16 | $27.35 | $59.83 | $131.50 | $38.39 |
| Average net bills per month | 2.76 | 2.28 | 4.99 | 10.96 | 3.20 |

### Large Cooking Customers.

A number of large heating and cooking installations have been secured on the heating and cooking rate. These include one installation totaling 73 kilowatts in a hospital and this installation includes instrument, hot tank, cold tank, utensil and dressing sterilizers used in the operating room, and hotplates, warming tables and ranges for preparing medicines and for cooking.

A contract has just been closed for a large electric baking installation for a commercial bakery. This installation will open a very large field for electric baking.

### Benefits of Electric Cooking Business.

The principal benefits of an electric-cooking load from the central-station company's standpoint are as follows:

(1.) The income from the average lighting customer who becomes a cooking customer is tripled at a less proportional additional capital expenditure than was incurred to serve the original lighting customer.

The average lighting customer pays about $18 per year, while the average cooking customer pays about $36 per year, so that when a lighting customer becomes a cooking customer

the total income from one residence is increased from $18 to $54 per year.

(2.) Electric ranges load up residence distribution systems in the day time where no load can be detected in the day time previous to their installation.

In most small towns the electric load on residence distribution systems in the day time is very small and the electric range enables the large investment in residence distribution systems to be used a total of about 10 hours per day instead of about four hours per day previous to their installation or an increase in hours use of 25 per cent.

(3.) The character and quality of electric service are improved where electric-cooking customers are served, as these customers instantly report interruptions to the proper men.

It was found that many of the men in repairing distribution systems were causing interruptions of from half a day to all day. As soon as electric ranges began to be used and such interruptions were caused to repair the lines, the cooking customers would call up the local operating men and complain about such interruptions. The men soon planned to repair the lines without causing as long an interruption, or in many cases without causing interruptions at all, so that the presence of cooking customers on the distribution systems bettered the service by eliminating many of these interruptions.

(4.) The electric-cooking load makes 24-hour service profitable in many small towns where very little power service is available.

Many towns are given 24-hour service in advance of the time when it can be made profitable because the necessary day load has not been secured. The use of electric ranges will undoubtedly make 24-hour service profitable in very small towns and hence it confers benefits on customers who do not use electric cooking as well as those who do.

(5.) Electric cooking makes electric service more necessary and indispensable to the household.

**The Toy Range Has Led to Many Standard Installations.**

Cooking in every family is an absolute necessity and the more necessities served by the electric utility, the more indispensable the electric service becomes.

Electric-cooking customers are among the most satisfied and enthusiastic customers served by any central-station company. Electric cooking also leads cooking customers to use many other electrical devices because their attention is called each day to the fact that electricity can be used for many more things than lighting service alone.

(6.) Electric cooking gives to small towns practically the same advantages in public utility service as are obtained in the large cities.

In large cities gas is available for cooking at a reasonable expense. The introduction of electric cooking in small towns where gas is not available gives to small communities practically the same advantages as large cities having both electric and gas service.

During 1917, to date, at least double the number of cooking customers has been secured as compared with the same number secured during corresponding months of 1916. It has been found that the greater the number of cooking customers in a given town the easier it is to make additional range sales and the number of cooking customers in such a town increases more rapidly than in towns not having as many cooking customers. This experience shows that only a small portion of the field for electric cooking in Central Illinois has been occupied.

The electric cooking business will soon grow to be one of the largest sources of income for the central-station industry, especially in communities where gas service is not available.

Electric cooking is undoubtedly one of the greatest potential fields for all central stations and particularly for those serving communities where gas service is not available.

Electric cooking popularizes electric service because of its inherent superiority, especially in baking and broiling operations, over other forms of fuel. It is absolutely clean and safe.

The electric range is the coolest range in summer and when the temperature reaches 100 degrees or more in the shade, this advantage becomes very real to the housewife who must spend a considerable portion of her time in the kitchen. The electric ranges now being used give good satisfaction and they are far past the experimental stage. The heating units now give very satisfactory life and the cost of repairs, even if burned out, is very small.

One of the great advantages of electric cooking is in baking or roasting where the oven is closed up tight, since no oxygen is needed for combustion. This method reduces shrinkage of meats and other food to almost nothing. The saving of shrinkage alone in foods over other fuels will pay a large portion of the electric bill and in these days when the high cost of living has become burdensome, such advantages are extremely important.

The use of the electric range entirely eliminates fire and the use of matches from the kitchen and the safety feature alone as an insurance against fire is one of the most important advantages.

### Results of Electric Cooking Business.

The results of the efforts of the Central Illinois Public Service Company to create an electric cooking load is best expressed by the number of heating and cooking customers secured at the close of the following years:

| Close of year. | Number of cooking customers. |
|---|---|
| 1914 | 15 |
| 1915 | 150 |
| 1916 | 650 |

The gross income obtained from the 650 cooking customers now on the Company's lines is running at the rate of about $25,000 per year, so that the electric cooking load has now begun to be a real factor in the Company's business.

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**Fund of $5,000,000 Granted for Scientific Research in England.**—It has been officially announced in the British Civil Service estimates that a grant of $5,000,000 is to be made in aid of scientific and industrial research. This grant will be paid to the account of the Imperial Trust for the encouragement of Scientific and Industrial Research. Grants will be made by the direction of a committee of the Privy Council over an agreed period to approved trade associations for research to supplement the funds of these associations.

# "Service First" in Range Campaigns

## *The First Cost of the Electric Range Is of Secondary Consideration if the Customer Is Interested on the Basis of the Service Which the Electric Method Offers*

By J. E. BULLARD

A SUCCESSFUL sales manager was criticising a salesman who had failed to close a deal. The salesman explained that the prospect liked the proposition, but hesitated about buying on account of the high price. The sales manager answered this explanation by saying:

"In this case you have shown yourself a poor salesman. You should have shown this prospect what the proposition would do for him and make him want it so much that he would be willing to pay any price to secure it. You showed your weakness by stating the price before you had created a real desire for the article on the part of the prospect."

This same manager in telling about his early experiences as a salesman said:

"When I was a salesman selling a high-priced article in the Middle West I never wanted any photographs. I never wanted any one to see what I had for sale until I had convinced him that it would do so much for him that he could not get along without it. After I had done so price did not matter. In fact most people thought they were getting the article very cheap. If they had seen a picture of it, however, before I had finished my talk many would have balked at the price. You see I was selling the service the article would render and not the article. Most people will pay any price for good service."

A few men in a New England city organized a company and undertook the sale of a map. It was a comparatively small map, could easily be carried in one's pocket and was sold by the company's salesmen directly to the consumer for the price of 98 cents. Some of the salesmen tried the experiment of carrying a sample map with them and trying to sell from the sample. They failed. It proved necessary to sell the idea, to sell the service the map would render to the purchaser before the map was shown or the price quoted. Unless this was done the price appeared high for such a small map. If the map was shown too soon the prospect could rarely be convinced that he could secure as much information from it and use it in as many ways as he actually could.

Electric-range salesmen are selling a comparatively high priced article. This article can never be sold on the basis of price alone. It makes very little difference whether the price to the consumer is cut down to below actual cost or advanced sufficiently to allow a tidy profit to the central station; the actual cost of manufacture is high enough to make even this cost seem prohibitive to the average electric energy consumer if the range is not sold on the service idea. If the prospect is not first convinced that the results to be obtained from an electric range are very much superior to those obtainable in any other way, any price that can be placed upon the range will seem high.

Price cutting alone never sold anything. Some one must first show the prospect how to use the article, must create a demand. It is not so many years ago that practically all gas companies were glad to dispose of their gas coke at any price, no matter how low. Some man finally decided to teach the public how to burn this coke in furnaces, base burners, and kitchen ranges. This winter gas companies have sold all the coke they could supply. In some cases they have received as much as $9.00 per ton for it and the purchasers considered this price comparatively low. It was not price alone that brought about this result. There is a far greater demand, today, for coke at $9.00 per ton than there formerly was at $1.00. People are willing to pay the advanced price because they know how to use the coke. They know how to make it render a service that is well worth the price paid.

If electric ranges were given away the probability is that there would be only a slight increase in the current consumed for electric cooking. If, however, these same ranges are sold for $100 each and from $10 to $25 is spent in showing the consumers how to use them to the very best advantage, the time will soon come when people will not want to do their cooking on any other kind of a range. It's the service rendered the purchaser and not price that really counts.

An electric power consumer was paying the central station $5.00 per month for electricity and was thoroughly dissatisfied. An electric power salesman showed him that by spending a few hundred dollars he could make the electric service of much greater value to himself. He spent this money, doubled his power

*A short while ago the Rockford (Ill.) Electric Company inaugurated an electric-range campaign and during the first week or two disposed of 20 ranges. The company immediately employed an experienced domestic-science teacher, who was familiar with electric cooking, as a demonstrator and assigned as her chief duties the instructing of these 20 customers in the proper use of the electric range. Needless to say, these customers have subsequently become most enthusiastic boosters for electric cooking and their testimonials, freely offered, form an important part of the company's sales propaganda. In addition to this, the demonstrator is in an admirable position to secure the names of range prospects from her intimate relations with present customers.*

*This is a character of service which is essential to the success of electric-range campaigns. The first cost of the electric range is high, the cost of operation in competition with natural or artificial gas may be high, but nevertheless electric cooking can be and is being made successful where "service first" is the slogan and where the customer is interested on a service basis rather than on a cost basis.*

*Price cutting alone never sold anything. Some one must first show the prospect how to use the article, must create a demand. This fact should be borne in mind in the sale of electric-cooking service and the matter of price entirely forgotten.*

*If electric ranges were given away the probability is that there would be only a slight increase in the current consumed for electric cooking. If, however, these same ranges are sold for $100 and from $10 to $25 is spent in showing the customer how to use them to the very best advantage, the time will soon come when people will not want to do their cooking on any other kind of range. It's the service rendered the purchaser and not price that really counts.*

*Mr. Bullard comments on these points in a very interesting manner, which emphasizes the importance of "service first."*

consumption and the bill he paid the electric company, but was satisfied. In fact, a few months after the salesman had taken up the matter with him he said:

"You are a mighty good friend of mine. You showed me how to get my money's worth. It's true that my electric bill is now higher than it ever was before, but the service I am now getting is worth many times the service I was getting before you called upon me. I am not only satisfied; I am very much pleased."

This man would not have been satisfied had his bill been merely reduced. What he wanted was service. He was willing to pay for that.

To further bear out this point, in the same city where this power user does business, there was a large electric light user who complained that his bills were too high. The company sent its meter man to make a cursory test and to reread the meter. At the end of a few months it reported that it could find nothing wrong and that the consumer had apparently consumed the energy. The consumer refused to pay the bill and allowed his meter to be removed. The company finally settled by accepting half the original amount.

This light user never used electric light again. The service rendered him in investigating his complaint was inadequate. Had it been adequate the electric company would have discovered that the boy who helped clean up the place early each morning was using the light. Had this been discovered the consumer would have been willing tc pay the full amount of the bill and would have considered the company a friend rather than an enemy.

### Service to Range Customers Is Essential.

Many an electrical range user is going to be careless in the use of the electric range, run up high bills, become dissatisfied and finally use the range for emergency purposes only, unless the service idea is placed far above the price of the range idea by all electric men. Not only must the prospect be shown the great value of electric cooking before the range is sold, but when she has become a purchaser and cooks by wire she must be given constant attention. The first two years are the most vital in the history of a cooking consumer. If sufficient attention is paid to the consumer during this period she will ever after be an enthusiastic user and a booster. If not enough attention is given there is grave danger that she will become dissatisfied and develop into a knocker. The salesmen, the demonstrator and the advertising man all must pay constant attention to new users if electric cooking is to win the success it deserves.

Far more revenue is lost by every gas and every electric company through lack of attention after the consumer has purchased appliances than through high selling prices of these appliances. To illustrate this point let us take an actual case.

A certain light and power user had installed an isolated plant. An electric power salesman persuaded him to give central-station service a trial. From the time the central-station energy was switched on until he received a bill the consumer never saw a representative of the company. The current was billed at a rate considerably higher than the consumer had been led to believe would be the case. One look at this bill was enough. He immediately had the central-station service discontinued. Later events showed that the real reason for losing this business was poor sales service rather than the high bill.

A year after this trial another power salesman called on this light and power user. This salesman showed him that the conditions under which he was working at the time were the cause of the high rate and not any dishonest intentions on the part of the company. He showed him that because his plant had operated only part time during the month of the trial the rate earned was the maximum rate. He then showed him that the double shift operation then in effect would earn the minimum rate.

At the end of several months of frequent interviews a shortage in the coal supply arose. The consumer then decided to give central-station service another trial. The salesman, however, did not stop calling as soon as the central-station meter was installed. Instead, he spent every Saturday morning in the plant. He went over the week's consumption with the engineer and the manager and suggested ways in which better results could be secured. He kept up this practice for several months when he was called away on a much bigger job. These months of constant attention, however, had so thoroughly converted the consumer to the advantages of central-station service that all these years since the second trial it has been paying the central station each month considerably more than twice the amount it paid for the first month's unsatisfactory trial. It was the service rendered by the second salesman that counted. Had he failed to give the attention he did give after central-station service was installed for the second time it is certain that the isolated plant would have been placed in operation again as soon as the coal supply become normal.

### What Experience Teaches.

The central-station industry in entering upon the sale of electricity for domestic cooking has the 50 years' experience the gas companies have had in selling cooking service and the 25 years that electric light and electric power have been sold to benefit from. After all this experience is analyzed it is found that it is always service and not price that counts. Today there are many power users actually paying more for electricity than it would cost them to generate their own power. They do this because the service rendered by the central stations makes the purchased power more profitable in the long run than the cheaper power that could be generated on the premises.

It will pay every one with anything to sell to bear this fact in mind. Before a prospect purchases he is under obligation to the salesman because that salesman is rendering him a real service in giving him valuable information entirely free of charge. As soon as the purchase is made, however, the burden of obligation immediately shifts. The purchaser is now paying for all information and service that can be rendered by the seller. The seller, therefore, is in duty bound to render this service and not devote all his time and attention to giving it free to prospects who have not yet purchased.

No employer is very enthusiastic in his praise of employes who spend practically all their time and energy in securing new positions rather than in trying to hold those they already have. Consumers look upon utility companies in very much the same light that employers look upon employes.

If this fact is firmly borne in mind in the sale of electric cooking service and the matter of price entirely forgotten the revenue from this new load will soon take on proportions that will not only gratify but greatly surprise everyone connected with the central-station business.

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**New Basis for Engineering Education.**—At a meeting of the Schenectady (N. Y.) Section, American Institute of Electrical Engineers, held April 20, the subject under discussion was "A New Basis for Engineering Education." Dr. C. R. Mann, of the Carnegie Foundation, who has made a study of the subject in connection with a committee appointed by the American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Civil Engineers and the American Society of Mining Engineers, together with a committee from the Society for the Promotion of Engineering Education, led the discussion.

# Latest Reports on Electric Cooking

## *A Compilation of Data Showing What Is Being Done to Sell Electric Ranges in a Number of Important Centers and What Results Are Being Obtained*

ELECTRIC cooking has become one of the most important fields for development by central-station companies, particularly in so far as residence business is concerned. The early apprehension regarding over-lapping peak and poor diversity has, in view of actual experience, been proved more or less unfounded and, in those cases where the business has been actively pushed, the results have been more than satisfactory.

In the following paragraphs are given the latest reports on electric-range activities from those communities where the greatest progress has been made in developing this business. It has been shown that public demonstrations at fairs, before women's clubs, in domestic-science schools and at the utilities display rooms are rapidly removing any doubts as to the performance of the electric range, and it will not be long before the concerted advertising campaigns on electric cooking will prepare the public mind to accept electric cooking as a matter of course. The question of the first cost of the range and cost of operation are bound to arise. The former depends largely on the manufacturer's price. It appears to be a common practice for the utility to sell the ranges at cost for a small profit and charge a fixed sum to cover the installation costs, permitting the customer to pay for the ranges on the installment plan if desired. This makes the relatively high cost less of a burden.

Considerable improvement has been made by the electric range manufacturers in the quality of their product. Generally this improvement has taken the form of more substantial element supports, better quality and placing of elements, aluminizing or in some way preventing the formation of rust in the oven, and a general strengthening of the weak spots which developed.

Some of the manufacturers have shown a commendable spirit of co-operation with the central stations by going over the range installations in general and noting points at which trouble has developed. The result of this "get-together" spirit is reflected in the changes made in range design which have tended, in a large degree, to eliminate many of the earlier troubles. Due to the many types of electric ranges on the market, the customer's requirements are taken care of remarkably well.

The question of voltage regulation is rapidly gaining the importance which it deserves and the problem of service, particularly in the rural districts, is more than ever vital.

It is generally conceded that it is the function of the utility company to provide a rate for electrical energy which will make possible an extended use of the range, supplanting all other methods of cooking. What such a rate must be will depend, to some extent, on the cost of other fuels used for cooking, although such costs cease to be as large a factor after the many advantages of electric cooking are appreciated. It is generally agreed throughout the country that the rate for cooking purposes must be under five cents per kilowatt-hour. A compilation recently prepared by the Society for Electrical Development shows that there are 3,156 communities in the United States having cooking rates under five cents. Of these 2,100 have a rate of four cents or less and over 1,000 have a rate of three cents or less per kilowatt-hour.

### Advertising Methods of Minneapolis Company.

The Minneapolis General Electric Company has been quite active in promoting electric cooking and now has over 300 ranges installed. A large share of this business has been obtained through extensive advertising that has been devised largely to educate the public to the advantages of electric

$10
OUR SPECIAL SPRING
Electric Range Bargain Offer!
$10
$10
Puts an Electric Range
In YOUR Home
$10
This is Our Special Spring Offer
And judging from our hundreds of satisfied range users, will be taken advantage of by hundreds of housewives. So we suggest you act NOW Drop in today if possible!
Come into 220 Loeb Arcade and learn the details of our easy payment plan NOW
The Minneapolis General Electric Company
15 South Fifth Street.

Electric
Cooking
Is becoming
More and More Popular
In Minneapolis
Why Not Investigate
For Yourself?
These Figures Will Give You
An Idea of the Low Cost of Electric Cooking
THE FIRST MONTH electric cooking is used is the most expensive from an operating standpoint. Within that time the cook has learned to use the range scientifically—results are highly pleasing and the amount of current consumed is agreeably small.
Here are some actual bills for various size families averaged during the past several months:
Family of three $2.63
Family of four $2.79
Family of five $2.82
Family of six $3.06
Family of seven $4.46
Family of eight $5.99
Come to our Electric Range Exhibition in the Loeb Arcade Building
Note the reasonable prices and the special deferred payment terms
The Minneapolis General Electric Company
15 South Fifth Street

Two Noteworthy Newspaper Advertisements Used in Minneapolis Campaign.

cooking. The company has adopted the slogan "Ultimately in Every Home" and this is being used in practically all of the company's cooking advertisements.

Two of the accompanying illustrations show newspaper advertisements recently used by the Minneapolis General Electric Company. The results from these were so satisfactory that a circular was prepared using the same copy, to be sent to the entire list of prospects. Another illustration shows a series of letters sent to range prospects by H. E. Young, sales manager of the company. These letters were sent to tenants living in apartments and residences, to builders of new homes and also to a selected list which the company prepared for the purpose. Other illustrations show literature and other advertising matter, which is self explanatory.

### Electric-Range Situation at Boston.

Prospects for sales of electric ranges in Boston Edison Company territory the coming season appear to be fairly good. The weekly output of ranges during the past month averages well up to normal, except that the absence of a large amount of apartment block construction in the Boston district this spring will result in a smaller number of large installations than last year.

There are now about 1,500 electric ranges on Boston Edison service, most of them in the residential districts and suburbs of the Back Bay, Brookline and Allston, but a good number are scattered through the smaller suburban places and in the country towns served by the Edison Company. The ranges average about six kilowatts each in rated consumption, which would make the total connected load something like 9,000 kilowatts. As yet little data has been formulated with respect to the load-factor and diversity-factor. It is obvious that the service is not entirely an off-peak load, since the evening use of ranges runs from about 5:30 to 8 or 8:30, and coincides with the period of early evening lighting during the greater part of the year. Ammeter records show a considerable diversity-factor with the various installations.

The range division of the appliance department—A. L. Smith, Jr., in charge—is now conducting a week's campaign in the rural town of Walpole. The company hired the town hall and demonstrations and lectures were given by a range expert on two days of the week.

This activity was preceded by a general circularizing of current users, personal calls following all expressions of interest as expressed in return postcards. There is no gas supply in Walpole, and the response to the electric-cooking proposition is general, and it is expected that a number of sales will result.

A similar campaign was recently carried on in the nearer suburb of Needham, where there is no gas supply, with gratifying results. This campaign was conducted from the company's local branch store, and was very successful.

A demonstration is being conducted continuously at the company's principal Boston appliance shop on Boylston Street during the spring and early summer. There are exhibited and offered for sale the Hughes, Hotpoint, Westinghouse and General Electric makes of ranges, and sales are being made from week to week.

C. E. Greenwood, superintendent of the appliance department, believes that sales of ranges for residence use will exceed those of last year.

An interesting installation, the first of its kind in the country, is one recently made by the Boston Edison Company at the Commonwealth Pier in Boston. This large public works, recently completed by the State at a cost of several million dollars, has an extensive immigrant receiving station that has been little used as yet. The pier is equipped for freight and passenger handling with the most modern electric machinery, there being electric winches on the wharf, and electrically driven pumps for water distribution and fire purposes, as well as an elaborate system of electric lighting and alarms and signals.

The general government has recently taken over the pier as a "receiving ship" for recruiting the Massachusetts Naval Reserve, and has prepared accommodations for housing and catering to 5,000 men.

On orders from the military authority the Boston Edison Company made an initial installation of 20 ranges with left-hand ovens. Sixty-three electricians were employed on the job, which was a rush job, and they began the work at about

A SPECIALIZED BUREAU OF COOKING EXPERTS READY TO HELP YOU
OUR Electric Cooking Bureau was established in the early part of 1916 for the special purpose of benefiting the housewives of Minneapolis by offering authoritative advice on cooking.
In the first year of its existence it has collected a large number of recipes and a vast amount of valuable information pertaining to cooking in general.
Miss Bernice Bell, who is our Domestic Science Expert, has helped develop the Bureau to a high state of efficiency and usefulness.
As a matter of fact, she is, literally, a "doctor of cooking", for her experience has brought her into contact with almost every conceivable problem in cooking.
It is quite possible that Miss Bell will be able to make suggestions and give you just the recipe you you have been looking for.
Call and see her any time. But be sure to mail the attached post card so that you will receive her favorite recipes from time to time.
THE MINNEAPOLIS GENERAL ELECTRIC CO.
220 Loeb Arcade

**This Mailing Card Advertised a Service That Was of Great Help in Selling Ranges.**

9 o'clock in the evening. At 4 p. m. the next day the equipment was in operation and the meal was being prepared for the men stationed in the pier.

A short time since, another emergency call was received, and the Edison company installed five hotel ranges having standard navy equipment such as is installed on United States battleships. This, like its predecessor, was a hurry job, and was completed overnight, about 40 men being employed.

It is noteworthy that electrical cooking equipment is the logical and only desirable kind under the conditions. The cooking at the Pier is done by regular navy cooks, who are accustomed to electric cooking apparatus on shipboard.

The Edison Company has a 6,900-volt primary substation in the headhouse of the pier. The connected load of the cooking equipment thus far installed amounts to about 215 kilowatts.

### Experience in Milwaukee.

The Milwaukee Electric Railway & Light Company is one of the most ardent advocates of electric cooking and has met with exceptional success in building up this load.

The scattered sections in which the installations are usually made has rendered it more or less impossible for the average company with a few hundred ranges installed, to separate and analyze the effect of the range load, except in the case of apartment buildings. But as the data accumulates, there seems to be grounds for the first burst of enthusiasm about the range business and it is being found that there is likely to be considerable truth to the predictions of high diversity of use, higher load-factor on the system, and other advantages resulting from an extended installation of electric ranges.

The individual maximum demand of single ranges may

average between 40 and 60 per cent of the connected load. The maximum demand for a group of, say, 25 ranges, will not exceed 15 per cent of the connected load. Although no authentic curves for an installation of 500 ranges can be shown, it is predicted that the maximum demand of such a group will not exceed 10 per cent of the connected load or, as we shall speak of it here, the diversity-factor will be 10.

It is further expected that when the electric range comes into general use among all classes of customers, if the experience with gas cooking in the average city may be drawn upon, that the peak load for cooking will occur between 11:30 a. m. and 1:00 p. m., because many people have the principal meal in the middle of the day.

Range installations in apartment buildings cause entirely different load conditions than in the average home.

A large diversity-factor is obtained with apartment installations, but the peak load occurs between 5:00 and 6:30 p. m., as compared with the noon peak in the average residences. This seems to be the experience quite generally. It is probably due to the average family in the apartment being smaller than in the house, less likelihood of school children to provide with warm meals at noon, and the general tendency toward a canned and baker's bread existence, which the average small flat induces. Such conditions relieve the peak demand at noon and shift it to evening. As the apartment building falls easiest prey to the many charms of electric cooking, it is likely that the initial loads caused by such installations in large cities will not represent the average conditions which will prevail when all classes are using the service for cooking.

TABLE I.—RECORD OF KILOWATT-HOURS USED FOR COOKING BY 20 CUSTOMERS IN MILWAUKEE.

| Customer No. | No. persons in household. | First. | Second. | Third. | Fourth. | Fifth. | Sixth. | Seventh. | Eighth. | Ninth. | Av. K.W.H. per month. | K.W.H. per person per day. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1..... | 4 | 112 | 98 | 102 | 193 | 145 | 149 | 159 | 122 | 136 | 135 | 1.12 |
| 2..... | 4 | 136 | 141 | 134 | 136 | 131 | 106 | 110 | 110 | 125 | 125 | 1.04 |
| 3..... | 4 | 80 | 78 | 86 | 83 | 111 | 114 | 89 | 114 | 84 | 93 | .77 |
| 4..... | 3 | 144 | 122 | 132 | 129 | 142 | 199 | 136 | 107 | 142 | 139 | 1.54 |
| 5..... | 2 | 79 | 60 | 45 | 64 | 66 | 53 | 41 | 74 | 95 | 64 | 1.07 |
| 6..... | 4 | 57 | 64 | 72 | 82 | 88 | 97 | 77 | 98 | 128 | 85 | .71 |
| 7..... | 4 | 220 | 186 | 70 | 112 | 120 | 98 | 77 | 134 | 143 | 129 | 1.07 |
| 8..... | 4 | 74 | 83 | 101 | 134 | 154 | 123 | 128 | 176 | 166 | 127 | 1.06 |
| 9..... | 5 | 190 | 158 | 141 | 171 | 178 | 223 | 217 | 253 | ... | 190 | 1.27 |
| 10..... | 5 | 55 | 64 | 65 | 81 | 76 | 105 | 88 | 112 | 78 | 80 | .53 |
| 11..... | 5 | 120 | 194 | 149 | 162 | 143 | 130 | 219 | 121 | 69 | 145 | .97 |
| 12..... | 8 | 202 | 315 | 312 | 274 | ... | ... | 146 | 268 | 244 | 252 | 1.05 |
| 13..... | 2 | 53 | 42 | 51 | 24 | 41 | 72 | 54 | 59 | 58 | 50 | .83 |
| 14..... | 7 | 119 | 135 | 159 | 213 | 132 | 142 | 122 | 96 | 150 | 141 | .67 |
| 15..... | 3 | 137 | 131 | 148 | 134 | 136 | 132 | 132 | 119 | 150 | 135 | 1.50 |
| 16..... | 3 | 91 | 83 | 42 | 54 | 21 | 73 | 72 | 64 | 80 | 64 | .71 |
| 17..... | 2 | 39 | 154 | 141 | 178 | 164 | 116 | 31 | 30 | 34 | 99 | 1.65 |
| 18..... | 3 | 130 | 157 | 175 | 148 | 143 | 295 | 167 | 151 | ... | 169 | 1.88 |
| 19..... | 2 | 64 | 65 | 73 | 47 | ... | 74 | 116 | 118 | 103 | 83 | 1.38 |
| 20..... | 4 | 206 | 29 | 43 | 151 | 155 | 125 | 98 | 159 | 119 | 121 | 1.01 |

### Activities in California.

During the year 1916 the Pacific Gas & Electric Company of California installed 335 electric ranges and 165 electric water heaters. The average monthly consumption and bills are tabulated below:

| | Average K.W. hours per month. | Average bill per month. |
|---|---|---|
| Range alone ..... | 103 | $3.65 |
| Water heater alone..... | 102 | 3.85 |
| Range and water heater..... | 242 | 6.65 |

It will be noted that the consumption of combination installations is greater than the average total of installations of range or water heater singly. This is accounted for by the fact that when both range and water heater are installed cooking and water heating are usually done entirely by the electric appliances, whereas if water heater or range are installed separately they are auxiliary to some other appliance and are not therefore used to the same extent.

As the company's rate depends upon the connected load a double-throw switch is installed to prevent the use of both range and water heater at one time.

The maximum demand of the electric range has been found to average 50 per cent of its rated capacity. Ranges are sold at manufacturers' list price less 10 per cent for cash. Installment terms are 10-per-cent down, the balance in 12 equal monthly payments. No charge is made for installation when the cost does not exceed $50, any amount in excess of this being borne by the consumer.

This Company has pursued a most conservative sales policy, as it considered it preferable to have a relatively smaller number of satisfied consumers who would aid the company by their recommendation.

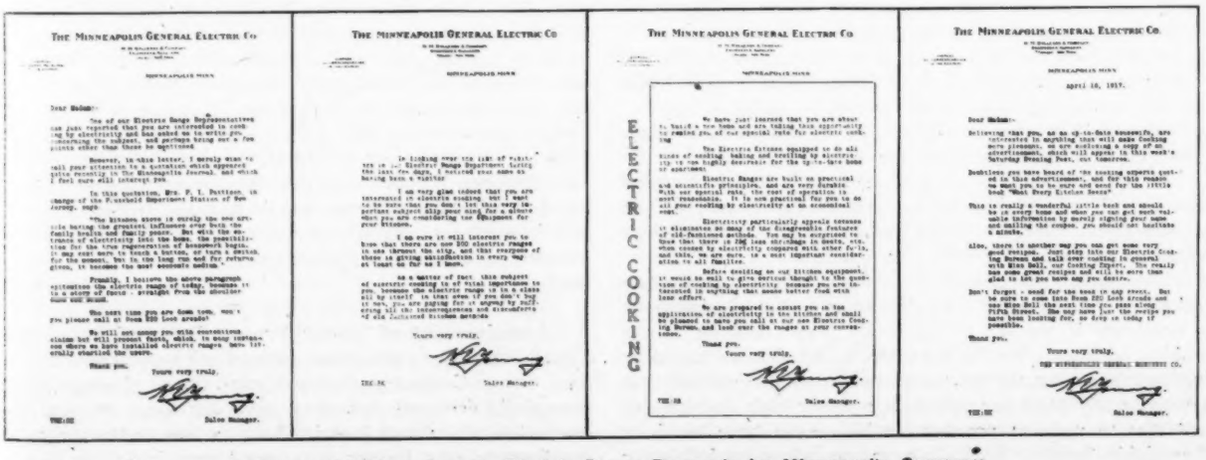
Each range installation is inspected from time to time to insure its maintenance in proper working condition, and lady demonstrators are employed to thoroughly educate the consumer in the economical operation of the appliance.

The majority of the prospects are created by public demonstrations, widely advertised as "Cooking Schools." These schools are almost invariably well attended and in the experience of the Pacific Gas & Electric Company have proved the best medium for exciting public interest. The prospects secured are followed up by salesmen, who are paid a straight salary.

### 1,500 Ranges in Southern California.

The Southern California Edison Company conducts a special department consisting of a manager and eight range salesmen whose time is devoted exclusively to the promotion of electric cooking.

An active range campaign was inaugurated in November, 1915, and at this date 1,590 electric ranges have been sold. Sales are made largely through house-to-house solicitation with the assistance of newspaper advertising, pamphlets and mailing cards. Cooking demonstrations and lectures are conducted in each city and town by an expert chef.


The Minneapolis General Electric Co
The Minneapolis General Electric Co
The Minneapolis General Electric Co
ELECTRIC COOKING
The Minneapolis General Electric Co

A Series of Letters Sent to Electric Range Prospects by Minneapolis Company.

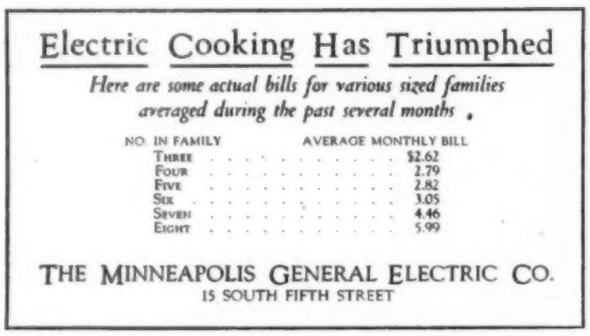
Experience has proved that the average monthly range consumption per range is 100 kilowatt-hours. Special efforts are made to install water heaters with each range. The water heaters on the system have an average daily consumption of two kilowatt-hours per person. Water heaters are installed without double-throw switches, it having been demonstrated that they do not materially increase but greatly broaden the peak.

Range sales for the year 1917 were estimated at 2,000 but will probably fall considerably short on account of the increase in list prices and the decrease in discounts by electric-range manufacturers.

The large number of ranges installed by the Southern California Edison Company are operating with complete satisfaction to their owners; this is evidenced by the fact that many range sales this year are due to recommendations from parties to whom ranges were sold last season.

ACTIVITIES OF THE SOUTHERN ILLINOIS LIGHT & POWER COMPANY.

In regard to the different methods for promoting electric cooking, we wish to mention the need of considerable caution in offering free trial installations, inasmuch as the question must be faced squarely concerning the expense of electric cooking. We do not mean that we consider the expense of




**An Announcement That Influenced Many Inquiries.**

electric cooking unduly excessive, but have found our average residence customer uses approximately 30 kilowatt-hours per month per member of the family, and at an average rate of 3.5 cents represents about $1.00 per month per member of the family. This is, of course, a considerably larger amount than some customers can afford to pay. There is no question about electric cooking being moderately economical; it is necessary to choose one's customers. A lady doing her own cooking is considerably more economical than a maid employed in a household.

We had one customer complain of excessive bills which were running nearly $10 per month, and found upon investigation that she was heating large amounts of water on the electric stove. The electric stove is not economical for this purpose and a customer should be so instructed.

The question of a proper rate is, of course, interesting. Our company has adopted a very ample rate, viz.:

First 50 kilowatt-hours used per month, 4c per kilowatt-hour. All over 50 kilowatt-hours used per month, 3c per kilowatt-hour. There is a five per cent discount for prompt payment; minimum bill $1.00 per month.

Considering the present efficiency of electric stoves, we feel that a rate of approximately two cents per kilowatt-hour is necessary if we are to secure the major portion of the cooking business. We do not mean to say that we would be justified in selling the energy at two cents but do feel that approximately $4.00 per month is a fairly high cooking bill and that to make it popular the bill would have to be in the neighborhood of $2.00. One way to reduce the bill is for the stove manufacturers to increase the efficiency of the heating elements, so that less kilowatt-hours are required to do the work.

The electric range enables the central station to use the residence distribution system at a time when other load is not available, and we have been surprised that we have been able to add stoves to our system without making more changes in the transformer installations. Of course, this only applies where a town has an up-to-date distribution system and the transformers are all of three kilowatt size and larger.

The slogan "Cook the Food, and not the Cook" is certainly an apt expression for the electric range.

## CENTRAL-STATION CUSTOMERS DO NOT WANT RATE REDUCTION.

**Action Against Bronx Gas & Electric Company for Lower Rates Dismissed at Request of Present Customers.**

The Public Service Commission for the First District has adopted an order and approved an opinion by Commissioner Travis H. Whitney discontinuing a proceeding against the Bronx (N. Y.) Gas & Electric Company in reference to the rates charged by the company for electricity. Since last January the Commission has been conducting an investigation into the company's rates in the course of which several hearings were held. The Bronx Gas & Electric Company serves with gas and electricity that portion of the Borough of the Bronx lying east of the Bronx River, formerly known as the town of Westchester, with the exception of the portion included in the limits of the former village of Williamsbridge. The gas rates of the company were not under investigation in the proceeding. The company charges a maximum rate of 12 cents per kilowatt-hour. In his opinion Commissioner Whitney held that it was inadvisable at this time to order a reduction in the company's rates. He noted that at the hearings various consumers and property owners in the territory served by the company objected to any action by the Commission involving a possible reduction in rates, contending that the public interests would be better promoted by conserving the earnings of the company under existing rates in order to enable it to provide for much needed extensions in facilities and service than by a reduction in rates which would diminish the company's earnings and its ability to secure additional capital required for the extensions. Commissioner Whitney found as a result of the testimony presented in the case and by other facts in the possession of the Commission that this contention was in large part justified inasmuch as the area covered by the company's service is about 16 square miles in extent with a population of only 35,000, a large part of the territory being sparsely settled and practically unimproved. The opinion noted that new rapid transit lines are entering this territory offering an earnest of early development for residential and business purposes on a large scale which would necessitate very material extensions by the company of its supply mains. He found that the company had a percentage of return from sale of electric current of 7.150 in 1915 which he held to be not excessive. In moving for the discontinuance of the proceeding Commissioner Whitney held that the company should be prepared to make prompt extensions of its mains to care for such new business as will appear within the area served by the company as a result of the opening of the new rapid transit lines.

**Abandonment of Power Project Basis of Suit.**—The United States Government has entered suit against the Housatonic Power Company, of New Haven, Conn., alleging that it wrongfully deducted from its income tax items for 1912 the sum of $63,315, which it claimed was a loss sustained by the abandonment of a former plant near Greenwich, Conn.

# Laws and Supreme Court Decisions Affecting Utility Companies

## *A Resume of a Few of the More Important State Laws and Court Decisions Affecting the Fundamental Principles of Utility Operation*

By E. C. MELBY

CENTRAL-STATION companies are governed by the same laws of contracts, agency, sales, torts, etc., as all other business firms and private parties. But because of their peculiar monopolistic and quasi-public character each state and municipality enacts special laws and regulations for such public service companies.

First, there is the charter or franchise which grants the company the right to serve the public within the state or municipality, and which may regulate the kind and quality of the service, the manner in which apparatus and appliances are to be erected, the rates to be charged, etc. Mostly all corporations now have to obtain a charter from the state in which they wish to carry on business, but no other corporations are tied and blindfolded to the degree practiced on public service companies.

Then, all the states enact special laws as mentioned, to further govern and control such corporations. These laws may vary in strictness, practicability and enforcibility in the different states, but in substance they are essentially the same. They tend to further regulate the terms and time of the franchise or contract, stipulate the powers of the municipality over the companies and the rights of the municipalities to enter into the public utility business for themselves. They also state the qualifications required of expert electricians and the safety precautions required of employers, grant the use of public roads and the highways for construction of pole lines, and the power to exercise eminent domain, etc.

### The Minnesota Statutes.

A section of the Minnesota Statutes which deals with a number of these problems reads as follows:

Sec. 1376, G. S. 1913. "Any city has the right to construct, operate or purchase any public utility within its corporate limits, or to lease the same to any company incorporated under the laws of this state, for a period not exceeding 20 years. Any such proposition must be adopted by a two-thirds vote of all the members of the City Council or other governing body after first having been submitted to the voters for approval and adopted by a three-fifths majority of all votes cast. The municipality may incorporate in the franchise granted such a company the right to take over the property at or before the expiration of the time of lease, on such terms as may be provided in the grant. Or the municipality may transfer such rights to another public utility company. The municipality is given full power to adopt needful rules and regulations, including the power to prescribe rates and charges. But such rates and charges shall be high enough to produce a revenue sufficient to bear all the costs of maintenance and operation and to meet the interest on all bonds and certificates issued on account of such public utility, and to permit the accumulation of a surplus or sinking fund that should be sufficient to meet all such outstanding bonds and certificates at maturity. * * * The municipality also has the right to issue bonds in order to operate such a utility if approved by a three-fifths majority of all votes cast by the inhabitants of said municipality. In a valuation of such properties for purposes of acquisition no account should be taken of the earning power of the utility or the value of any unexpired term of the franchise. But when leasing such properties to a public utility company the rental shall be based on both the actual value of the tangible property and the value of the franchise contained in the lease."

It should be noticed here that in the regulation of rates and charges no account has to be taken of any return on the investment to the owners of the utility. Also, that for purposes of acquisition, only the tangible value of the property is to be considered, while in the case of a utility leased by the municipality to private operators the rental charged should also take into account the value of the franchise, an intangible property. In different parts of the country different rules have been governing but most states now allow for "earning capacity" and "cost of franchise" in their valuation of public utilities.

### Going Value Recognized in New York.

The Appellate division of the New York Supreme Court in 156 N. Y. 603, recognized the justification of "going value" and set aside a valuation of the Public Service Commission of the properties of a water-power company in which no allowance had been made for such intangible property. In Wisconsin there are two sections in the Statutes which plainly recognize the value of a franchise. Section 1753, 1915 Statutes, limits the value of a franchise to the actual cost thereof, i. e., to the sum paid therefor to the state or the municipality granting the same. Section 943 legalizes the purchase of such franchise and other properties by the municipality. The Wisconsin Railroad Commission also generally allows for "going value" in its valuation of public utility properties.

Where the terms agreed on between the municipality and the public utility company are found to be unfair to the company, the courts may alter such contract. In 95 A. 749, the New Jersey Supreme Court held that where the rates agreed on between the municipality and the company were found too low, the Commission had the power to fix higher rates since the state, through the agency of the Commission, may waive the contract rights of the public, without improperly impairing the obligation of the contract.

Generally, public utility companies and municipalities operating public utilities are given the power of eminent domain; that is, they may condemn property whether private or public, for the use of their business. (Sec. 1386, G. S. Minn. 1913.)

In 101 Minn. 197, it was held that a public service corporation authorized to furnish power for public and private use need not first obtain a franchise from the municipality before it was entitled to exercise the power of eminent domain. The Supreme Court of Appeals of Virginia (89 S. W. 273) has held that the Legislature can not make a private use public by calling it so; and that to justify the exercise of the power of eminent domain the property taken must be for a use in which the public as such has an interest.

### Erection of Pole Lines.

Although the Statutes of most states grant public service corporations the right to construct their pole lines on public roads and highways much legal dispute has resulted herefrom, especially between cities and companies employing their streets

for distribution of electrical energy. In the case of the Duquesne Light Company vs. City of Pittsburgh (97 A. 85) the city was held to have the power to compel the removal of poles and overhead wires from a street provided the power was exercised in a reasonable manner.

The Supreme Court of Oregon, in 156 Pac. 1058, and the Supreme Court of South Dakota, in 156 N. W. 63, have held that when in a franchise granting the corporation the use of the city streets for the distribution and sale of electricity, a provision is made that the company was to pay the city a certain percentage of its gross income within the city, this payment was a rental for the use of the streets and not a "tax."

The Supreme Court of Iowa has held that the regulation of pole-line construction by a city is merely an exercise of its police power. (154 N. W. 1678.)

THE LIABILITY OF A UTILITY.

Personal injuries as a result of coming in contact with electric wires or apparatus have been the source of more legal actions against central-station corporations than any other known cause. The Minnesota Statutes in a section on the protection of dangerous machinery, provides that "the intaking side of all systems of electric wiring and transmission and all dynamos and other electrical apparatus * * * shall be fenced, boxed and otherwise protected to the fullest degree practicable." (G. S. Sec. 3862.) The object of this section is to protect workmen and the statute should be so construed. It has been held immaterial that the owner could not have anticipated the injury in the precise manner it occurred. (93 Minn. 242), (83 Minn. 25.) This provision does not, however, change the law as to contributory negligence or the assumption of risk. Expert workmen who neglect to use safety devices furnished by their employer assume the risk incidental to the work. In 89 S. 262, it was held that injury without proof of negligence on the part of the defendant company gives no right of recovery. The Supreme Court of Iowa has held (157 N. W. 206) that it was negligence on the part of the company to leave its wires hanging so low above the ground that a land owner passing from his fields onto the highway came in contact with them, although this place was not a regular place for ingress and egress.

Courts have also had to pass upon the question as to what voltage is sufficient to cause death. In 156 P. 654, the Supreme Court of Oklahoma held that 110 volts was not sufficient to cause death. In an action against the Lancaster Electric Light Company (181 S. W. 967) the Court of Appeals of Kentucky held that although 220 volts would not cause death under ordinary conditions, such a voltage was certainly dangerous. The court says: "While such a charge of electricity might not cause death, it is easy to see how it might bring about serious injury. It might cause such a shock as to wreck one's whole nervous system or it might throw or hurl him against some object which would result in maiming or injuring him for life. Manifestly such a charge of electricity is dangerous."

The laws and decisions discussed above, together with a great many others not here considered, constitute the legal business code for public utility corporations. It is in the interest of all corporations to stay within the law and prevent court actions, but where statutory provisions and court decisions vary so much and are so intricate as in the public utility business, it has to be expected that legal complications and litigations are numerous.

One of the many reasons for this undesirable situation is to be found in the great power given municipalities to regulate the utility companies within their boundaries. Men without any qualifications for such work and who cannot be expected to know anything about the business of the companies they are set to regulate will see matters of controversy between the utilities and the public from the point of view of the consumer only and will act accordingly, especially since they may expect some political reward for such "regulation."

The public service commissions now instituted in a majority of the states have largely done away with this arbitrary and uncertain condition of affairs and have materially reduced dissatisfaction and litigation between the companies and the public, although the commission decisions may be appealed to the higher courts if unsatisfactory.

The Interstate Commerce Commission is now working out a plan for a fair valuation of public utility properties, which, it is expected, will be adopted by all state utility commissions, thereby making the rulings more uniform in the different states.

With a uniform ruling all over the country and a fair valuation allowed the companies, the problem of public utility regulation will have been brought very much closer to its final solution, to the best interests of the public as well as the companies, and much legal dispute, uncertainty and annoyance will be prevented.

## Tidewater Power Company Transfers Control.

William J. Norton has announced for the firm of Norton, Bird & Whitman that this company has concluded the transfer of the utility property of the Tidewater Power Company, of Wilmington, N. C., to Brooks & Company, of Scranton, Pa. The Tidewater Power Company controls the street railways of Wilmington, N. C., as well as an interurban line between Wilmington and Wrightsville Beach on the Atlantic Ocean, about 30 miles of street railway system. The company also controls electric light and gas utilities, and leases the Consolidated Railway, Light & Power Company. It lights Wrightsville, Wrightsville Beach and Winter Park. The company also owns 1,500 acres of suburban real estate.

Hugh MacRae, president of the company and heretofore in control of the property, it is understood, will devote his entire time hereafter to the development of about 70,000 acres of farm land which he owns on a comprehensive scheme of colonization.

Brooks & Company, of Scranton, have been closely identified with the United Service Company, of Scranton, Pa., operating utilities in Ohio and Indiana, and having an established connection with the Keystone Utilities Company, operating in Pennsylvania. The United Service Company controls through stock ownership the East Pennsylvania Gas & Electric Company, of Bristol, Pa.; the Jefferson Electric Company, Punxsutawney, Pa.; the Warren Light & Power Company, Warren, Pa.; Warren Electric Company, Warren, Pa.; the Wabash Water & Light Company, Wabash, Ind., and the Ohio Service Company, Cambridge, O. The company also operates the Hanover, Pa., and the McSherrystown Street Railway Company, the Hanover Light, Heat & Power Company and the Northern Michigan Water Company, Escanaba, Mich.

This week L. H. Conklin, treasurer and general manager of the associated companies, assumed control of the Tidewater Power Company.

**Open Forum on Removal of Coatings at Junctions of Metallic Conduit.**—The Western New England Section of the National Association of Electrical Inspectors has announced an open forum at its fall meeting to be held at South Norwalk, Conn., October 12. The particular subject for discussion will be on the general topic of removing non-metallic protective coatings at junctions of metallic conduit, moldings, fittings, etc. The discussion will be based on a paper with this general title prepared by Thomas H. Day and published in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of April 21, 1917. The purpose of the article was to bring out constructive criticism and it is hoped that manufacturers and others interested in this subject will attend the meeting and give free expression to their views.

# Notes on Commercial Practice

***New-Business Methods, Policies, Rates and Kindred Central Station Matters for the Man Engaged in Selling Electricity***

## Costs of Electric Delivery for Ice-Cream Manufacturers.

The ice-cream manufacturer must make his delivery system and equipment one of his most important considerations. A careful study of trucking, noting all types of transportation—the horse, the gasoline and electric truck, in a large number of varied installations will establish the "electric" as the most economical method of delivery for comparatively short hauls with 2-ton, 3.5-ton, or 5-ton vehicles, all factors considered.

In a recent address before the National Association of Ice Cream Manufacturers, Alling L. Parkhurst quoted some interesting cost figures based on average conditions with a daily route of 35 miles and modern electric trucks:

TWO-TON TRUCK.

| | |
|---|---|
| Repairs and painting | $ 140.00 |
| Battery repair and renewal | 312.75 |
| Tire repair and renewal | 212.90 |
| Miscellaneous, grease, water, etc | 40.00 |
| Garage at $15 per month | 180.00 |
| Driver at $15 per week | 780.00 |
| Electric current, 7,900 k.w.-h. at 4c | 316.00 |
| Depreciation of chassis at 10 per cent | 185.30 |
| Depreciation of body at 20 per cent ($300) | 60.00 |
| Interest at 3 per cent | 99.00 |
| Liability insurance | 100.00 |
| Fire insurance at 1 per cent | 33.00 |
| Total cost per year | $2,458.95 |
| Total cost per day | 6.92 |

THREE-AND-ONE-HALF-TON TRUCK.

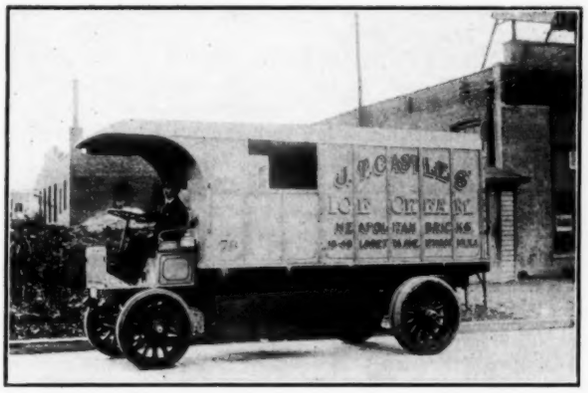
| | |
|---|---|
| Repairs and painting | $ 165.00 |
| Battery repair and renewal | 347.00 |
| Tire repair and renewal | 344.61 |
| Miscellaneous, grease, water, etc | 50.00 |
| Garage at $15 per month | 180.00 |
| Driver at $15 per week | 780.00 |
| Electric current, 9,050 k.w.-h. at 4c | 362.00 |
| Depreciation of chassis at 10 per cent | 225.00 |
| Depreciation of body at 20 per cent ($475) | 95.00 |
| Interest at 3 per cent | 123.75 |
| Liability insurance | 100.00 |
| Fire insurance at 1 per cent | 41.25 |
| Total cost per year | $2,813.61 |
| Total cost per day | 7.92 |

FIVE-TON TRUCK.

| | |
|---|---|
| Repairs and painting | $ 180.00 |
| Battery repair and renewal | 428.88 |
| Tire repair and renewal | 439.80 |
| Miscellaneous, grease, water, etc | 50.00 |
| Garage at $15 per month | 180.00 |
| Driver at $15 per week | 780.00 |
| Electric current, 11,150 k.w.-h. at 4c | 446.00 |
| Depreciation of chassis at 10 per cent | 253.72 |
| Depreciation of body at 20 per cent ($500) | 100.00 |
| Interest at 3 per cent | 143.25 |
| Liability insurance | 100.00 |
| Fire insurance at 1 per cent | 47.75 |
| Total cost per year | $3,149.40 |
| Total cost per day | 8.87 |

The Electric Vehicle Section, National Electric Light Association, has been advised that a New Jersey ice-cream manufacturer is today operating 12 electric trucks seven days a week, each of the five-ton trucks replacing six horses, and each of the small trucks replacing four horses. The average daily total cost of these trucks during one month last summer ranged from $6.87 (2-ton truck) to $8.98 (5-ton truck), the average mileage being about 22 miles.

Another interesting feature of this same installation is the waterproof construction of the truck bodies which successfully prevents the salt water from coming in contact with the running parts, thereby eliminating considerable trouble. Tar paper was laid over the flooring of the truck crosswise, each strip being carefully lapped over the next one. This tar paper was run up the front and sides of the truck to a height of about 6 inches, and all the seams were carefully filled in with tar. Galvanized sheet metal was then fastened to the front and sides of the body to a height of 36 inches, lapping over the tar paper near the floor. A wooden flooring was then placed over the tar paper running lengthwise with the body. At the front end of the body two three-quarter-inch holes were drilled and pipe nipples were inserted. A length of rubber hose connected with these pipe nipples and projecting down to about six inches from the ground drains off the brine solution so that it does not come in contact with any of the metal parts. The salt solution at the rear of the body drains off the tailboard which is always carried down. This is an important as well as an interesting feature because the delivery equipment of an ice-cream manufacturer usually depreciates more rapidly than the equipment of any other business.



Electric Vehicle Used by New Jersey Ice-Cream Manufacturer.

## Fall River Company Increases Power Rates on Coal Cost Basis.

High-priced coal is given as one of the principal reasons for an increase in the rates for electricity furnished to power customers by the Fall River Electric Light Company, Fall River, Mass. Under the new schedule, effective July 1, the rates will be increased on the basis of one mill per kilowatt-hour for every dollar increase in the cost of coal above $4 per ton.

## Colorado Power Company Secures Electric-Furnace Contract.

The Colorado Power Company, Denver, Colo., has signed a new contract for an electrometallurgical installation for a manufacturer of ferrotungsten, in the Colorado mining district, providing for 600 kilowatts and producing a yearly gross income of about $25,000.

## Louisville Company Helps Employees in "Make a Garden" Campaign—Free Seeds and Prizes Given.

All the employees of the Louisville Gas & Electric Company have been urged to "plant a garden" and demonstrate their desire to help their country by raising some of the food that each of them eat. The proposition was put up to them by Donald McDonald, vice-president and general manager of the company, in a letter which was distributed among all of the employees. The letter is as follows:

"Our country is at war; many men are privileged to bear arms; others are unfitted by age or physique to serve as active soldiers, but everyone can do something to aid the country in its hour of need.

"The production of food is the most important service next to actual fighting. Every pound of food that you raise for yourself is one less pound that you will have to buy and consequently a pound that remains for the soldiers who must have food. Make a garden.

"It requires a very small garden space in the rear yard to supply a family with its entire requirements of fresh vegetables. A bountiful supply of vegetables close at hand where they may be secured in a few moments is of even more importance than money value.

"A half-hour's exercise in the garden before breakfast, or before the evening meal, is a form of recreation which beats any spring tonic ever prescribed. It lends zest to the appetite and improves you both mentally and physically. Every healthy man should have a hobby. Make your garden your hobby this spring. Cultivate a garden if you have but ten feet of space.

"Packages of assorted seed will be furnished free to employees upon application to heads of departments, provided the employee, upon making application, intends planting the seeds in his own garden. A substantial prize, to be announced later, will be awarded to the employee producing the best results. In awarding this prize the size of the garden will not be considered, but the prize will be awarded to the garden which is best kept and which produces the best results per square foot.

"Seeds will be ready for distribution by April 20. Start at once to spade up your garden space and get ready for planting.

"Any employee not familiar with gardening will receive, free of charge, a booklet entitled 'The Home Vegetable Garden,' upon application to the Commercial Department."

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## The New House-Wiring Booklet of the Brooklyn Edison Company.

Shortly after the first of this year the Brooklyn Edison Company issued a revised edition of its booklet entitled "The Edison Easy Payment House-Wiring Plan."

The house-wiring plan was put into effect by the company a few years ago and at that time the booklet prepared, while comprehensive in its efforts, was too large in size.

The size of the new booklet, 6 by 9, was adopted as being more convenient to slip into the pocket and more easily referred to than the old one.

The house-wiring plan of the Brooklyn Edison Company covers that ever present question "How much will it cost to wire my home?" Residential wiring has been standardized by arranging a schedule of prices which show how much it

PRICE SCHEDULE

KITCHEN

No. 1. Ceiling outlet with one-light fixture, pull chain socket and a baseboard or side wall flush receptacle located in kitchen on the first floor - $20.65

CELLAR

No. 2. Ceiling receptacle in cellar near heating apparatus with flush switch at head of cellar stairs - 7.75

HALL

No. 3. Ceiling outlet in hall with one-light chain fixture and pull chain socket - - - - - - 9.25
(If wall bracket is desired instead, deduct $1.55)

DINING ROOM

No. 4. Ceiling outlet with three-light shower fixture, pull chain sockets - - - - - - - 14.00
(4a. If amber glass dome is desired instead, add 75c.)

PIAZZA

No. 5. Ceiling outlet on piazza, ceiling fixture with switch in hall - - - - - - - - 10.85

BED ROOM

No. 6. Ceiling outlet with two-light shower fixture, pull chain sockets - - - - - - - 9.35

LIBRARY

No. 7. Ceiling outlet with 16-inch bowl fixture, three lamp sockets and side wall switch - - - 17.45

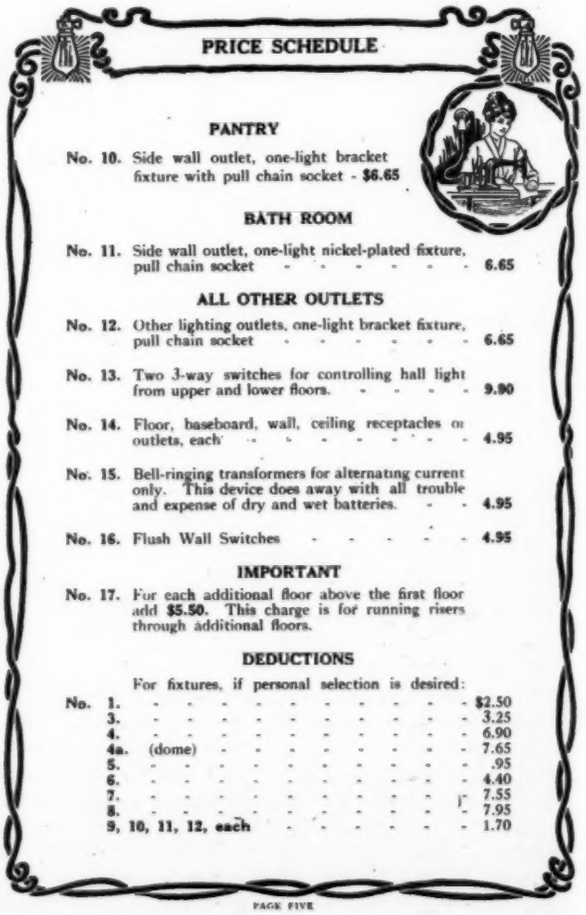
PARLOR

No. 8. Ceiling outlet with four-light shower fixture, pull chain sockets - - - - - - - 12.90

CHINA CLOSET

No. 9. Side wall outlet, one-light bracket fixture with pull chain socket - - - - - - - 6.65

PAGE FOUR



PRICE SCHEDULE

PANTRY

No. 10. Side wall outlet, one-light bracket fixture with pull chain socket - $6.65

BATH ROOM

No. 11. Side wall outlet, one-light nickel-plated fixture, pull chain socket - - - - - - - 6.65

ALL OTHER OUTLETS

No. 12. Other lighting outlets, one-light bracket fixture, pull chain socket - - - - - - - 6.65

No. 13. Two 3-way switches for controlling hall light from upper and lower floors. - - - - - 9.90

No. 14. Floor, baseboard, wall, ceiling receptacles or outlets, each - - - - - - - - - 4.95

No. 15. Bell-ringing transformers for alternating current only. This device does away with all trouble and expense of dry and wet batteries. - - 4.95

No. 16. Flush Wall Switches - - - - - - 4.95

IMPORTANT

No. 17. For each additional floor above the first floor add $5.50. This charge is for running risers through additional floors.

DEDUCTIONS

For fixtures, if personal selection is desired:

| | | |
|---|---|---|
| No. 1. | - - - - - - - - - - - - | $2.50 |
| 3. | - - - - - - - - - - - - | 3.25 |
| 4. | - - - - - - - - - - - - | 6.90 |
| 4a. | (dome) - - - - - - - - - - | 7.65 |
| 5. | - - - - - - - - - - - - | .95 |
| 6. | - - - - - - - - - - - - | 4.40 |
| 7. | - - - - - - - - - - - - | 7.55 |
| 8. | - - - - - - - - - - - - | 7.95 |
| 9, 10, 11, 12, each | - - - - - - - | 1.70 |

PAGE FIVE

Two Pages from New House-Wiring Booklet of Brooklyn Company.

DINING ROOM
Proposition No. 4. - - - - - - - - $14.00
Includes a three-light fixture connected to a ceiling outlet, appropriately equipped with shades and pull chain sockets. This fixture will supply an even distribution of light and at the same time afford opportunity for the use of electric table devices; but baseboard outlets will be found more convenient for such electric appliances as portable lamps and vacuum cleaners.
PAGE SEVEN

**Page From Brooklyn Booklet.**

will cost to wire one room, one floor or all of the home complete—including wiring, fixtures, glassware, Edison mazda lamps and service connections.

A prospective customer without any other information than contained in this booklet may figure out the exact cost of equipping his home as he desires. The price schedule shows the cost of installation of wiring and fixtures in any room of the house.

Half-tone cuts show the detail of each fixture supplied on this proposition. Suggestions are made throughout the book for the installation of baseboard and side-wall receptacles for the convenient use of household electric appliances.

In order that the house-wiring plan will be attractive to the householder of small means a partial payment plan has been inaugurated with minimum monthly payments as low as $2.00 which may be spread over a period of from 6 to 20 months.

During "Wire Your Home Time" the Brooklyn Edison Company is offering a 10 per cent discount to householders along existing service mains, signing a regular house-wiring contract.

Approximately 500 house-wiring contracts were signed on this plan during "Wire Your Home Time" in 1916 and this year plans have been made to take care of a still greater number.

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**Summer-Resort Residents Seek Rate Reduction.**—A petition has been filed with the Maine Public Utilities Commission, seeking a reduction in rates and alleging discrimination in Old Orchard, Me., for service furnished by the York County Power Company. Petitioners, who comprise all-the-year residents, claim that the summer schedule should apply only to three months, instead of four.

## Four Important Steps in Selling Ranges in St. Louis.

The accompanying illustrations of four recent newspaper advertisements emphasize four important steps in the campaign of the Union Electric Light & Power Company, of St. Louis, Mo., to sell electric ranges. Under the direction of C. E. Michel, the company has made gratifying progress in this field. The four items emphazised in the advertisements are low rates in effect for electric cooking, the 45-day guarantee of the company with partial-payment arrangement, the economy of electric cooking because of concentration of heat, and the convenience of electric cooking.

Under the caption, "The Meter Proves Electric Range Economy," the company states that St. Louis records show that the average monthly bill for cooking and lighting for families of two is only $3.41, while the average for all-sized families and for all-sized homes, figured from the bills of hundreds of St. Louis range users is only $4.56.

Electric cooking is hailed as woman's deliverance from many hours of labor that women without electric ranges must spend in scouring pots and pans.

The company's special 45-day offer provides for the installation of an electric range at cost price, including wiring. The

While You Do Your Housework
The Meals Will Cook Without Attention
You Can Always Be Sure of Your Cooking On an Electric Range
Such kitchen tragedies as fallen cake, soggy pie, or underdone biscuits, do not occur in hundreds of St. Louis homes where women use electricity for cooking.
You simply twist the switch to the degree of heat you want—high, medium, or low.
And day after day, under all conditions, it is the same. It does not depend upon "quality" of fuel, or wind, humidity or luck.
Have you never heard women remark, "I can never depend on my stove"?
That does not happen with an electric range. Fancy the delight of always having perfect meals—juicy meats; brown, light biscuits—all appetizing dishes you like—never dried up nor burned.
Saves Money and Time
Electric cooking is in high favor in 3,000 communities. Yet few cities have the advantage of rates as low as here. That clearly shows the electric way must far excel.
And our own records, which you may inspect, show that it costs hundreds of St. Louis people who are using electric ranges an average of $4.56 per month for all electricity used in their homes (both for cooking and lighting). This is an average for all sizes of families and homes.
Cooking the electric way saves a vast amount of time and work in the kitchen. There is no open flame to blacken pots and pans. Hence scouring of smudge and grime from pots and pans is abolished.
Kitchen walls remain spotless—there are no fumes or smoke—kitchen surroundings are clean, kitchen temperature is comfortable to work in and kitchen air is fresh and healthful to breathe.
Saves Food and Flavors
Electric cooking does not dry out the food like ordinary cook stoves do. It prevents more than half of the shrinkage or "cooking down."
That means lower grocery bills. And juicy, palatable food, with the maximum of nutriment.
Only by cooking electrically can you realize the delights of this super-method. So we propose to install a range in your own kitchen.
Test This Yourself at Home
Pay only one-tenth of the price of the range at the time of purchase. Cook on it 45 days. Prepare your favorite dishes in your own way.
If it does not do what we say it will do, we will remove the range and refund all your money (except for current used).
If you keep the range you can pay the balance monthly in 11 equal payments.
Under this plan a range is easy to own. Telephone, call or write for full information at once.
CALL FOR TICKETS TO THE HOUSEHOLD SHOW FREE
Electric cooking is being demonstrated at the Household Show at the Coliseum. If you like, you can prepare your favorite dish there on an electric range. Tickets have been purchased for our customers. While they last you can secure them free by calling at any of our offices.
Electricity Is Cheap in St. Louis
THE ELECTRIC COMPANY
Union Electric—Main Office, 12th and Locust
Branches: 4013 Delmar; 3018 North Grand; 3012 South Grand
Six Offices in the County

**This Advertisement Convinced Many St. Louis Housewives.**

customer is permitted to use the range for 45 days. If at the end of that time the customer is not entirely satisfied the range is removed and all money refunded, except that paid for energy. One tenth of the cost is paid at the time of installation and if the range is retained the balance is paid in 11 monthly installments.

# Accept Our 45-Day Guarantee

**Learn Why Electric Cooking Rules in Thousands of Homes**

Our object is not to make money on electric ranges.

What we propose is to sell you the fuel—electric current—when you have bought a range.

If you purchase the range from us, we will install the necessary wiring, etc., at our own expense.

You need pay only a tenth of the price of the range at the time of purchase. Then cook all your meals on it 45 days.

If you keep the range after that, pay the balance monthly for 11 months. But if your range does not do what we claim, we will remove it and refund all money you have paid (except for electric current used).

We are willing to make this guarantee because we know that women who cook this way cannot be induced to return to inferior methods.

**In Small Homes and Mansions**

Electric cooking is favored by thousands of women in 3,500 communities in the United States.

Here in St. Louis where the rate is only 3 cents per kilowatt hour, the advantage of the electric way is tremendous.

And in hundreds of St. Louis homes—from cottages to magnificent residences, all food is prepared on electric ranges.

Families in small homes and mansions sit down to meals cooked as nutritiously and palatably as those set before kings.

Even the inexpensive cuts of meat will come out juicy, tender and delicious.

For electric cooking retains all savors and flavors. The fiber is thoroughly cooked — toughness disappears, and you serve new delights at very low cost.

**Spotless Kitchen —Smokeless House**

"I find electricity very much cleaner," writes one St. Louis housewife (name on request), "not only in the kitchen but throughout the house. It does away with fumes and the smoke created by the burning of grease in contact with a blaze."

Be free of the drudgery of scouring pots and pans—keep your kitchen cool and comfortable, with spotless ceilings and walls.

Save many hours a month—save food—save work and health and money.

All these advantages come with electric cooking.

Each week we are installing many electric ranges.

Now many more women will want them on our 45-day guarantee.

So don't put off. That might delay installation. Write, call or telephone for full information today.

**Electric Ranges are Inexpensive to Operate**

The average monthly bill for hundreds of our customers who use electric ranges is $4.50 for electric cooking and lighting combined. This is an average for all-sized families and homes.

*Electricity Is Cheap in St. Louis*

## The Electric Company

Union Electric: Main Office, 12th and Locust
Branches: 4912 Delmar: 3028 N. Grand: 3012 S. Grand
SIX OFFICES IN THE COUNTY

**An Advertisement of Special Offer Which Influenced Many Sales.**

The rate for electric cooking in St. Louis is three cents per kilowatt-hour.

## Fower Company Dedicates Its Resources to the Government.

At the formal raising of the United States flag in Atlanta, Ga., April 14, over the building of the Electric and Gas Company, Preston Arkwright, president of the Georgia Railway & Power Company, dedicated the resources of the company to the United States government.

"We have been living in times of peace and we have rather taken our country for granted," Mr. Arkwright said. "You don't get much love of country or love of anything else worth while until you have done something for it, served it, sacrificed for it.

"Heretofore the American flag has not meant so much to us. It has served as a colorful decoration at conventions and at carnivals. But this is a day of trial and a day of war and it does not do to treat the emblem of our country in such casual fashion. Rather should we regard it with a great love, with a willingness to serve it, suffer for it, sacrifice everything for it.

"This war that we are entering upon is not for us a selfish war or a war of our seeking. It was forced upon us and we shall prosecute it with the most human motives, with the highest purposes. I think that it is to be a war without profit to anyone, but a war of patriotism and a war of universal participation. Business concerns can be just as patriotic as individuals. I think this war will prove that. We dedicate our company to the service of our country and we consecrate—every person here—his individual self to the nation."

## Indianapois Company Encourages Men to Enlist.

The *Hoosier Guard* is a weekly newspaper published for members of the Indiana National Guard, stationed at various posts, and, in the words of the publishers: "links the boys in service with the folks at home." In the issue dated April 21 the Merchants Heat & Light Company of Indianapolis, has a full-page advertisement, dedicated to "The Men of 1917."

The following editorial in this issue pays a tribute to the patriotism of the company:

"The Merchant's Heat & Light Company, through its president, H. H. Harrison, is to be thanked for publishing this issue of the *Hoosier Guard*. The company has become known as a pace setter for patriotism. Every encouragement was given its employees who enlisted when the call to the colors for Mexican border service was sounded nearly a year ago.

"The company not only cared for its enlisted men in a financial way but held their positions open for them while they were serving their nation on the Texan plains. The courtesy of the company extended further at the time; each member of certain Indianapolis units receiving a package of post-cards from the company just before the departure to facilitate correspondence with the home folk.

"Inspiring messages from the motograph at the 'Daylight Corner' have also stimulated patriotism in the Hoosier capital in the present crisis. Hoosier guardsmen appreciate the kindly words paid them by the company in this issue and also for the kindness that made possible the publication of this, the second number of our series published in the interests of recruiting our own Indiana National Guard to full war strength."

## Average Cooking Bill in Benton Harbor Is $3.50.

Having once pointed out the advantages of electric cooking, the Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., has found that orders for electric ranges come in without any special campaign efforts. So far this spring, John A. Cavanaugh, superintendent of the company, reports there have been six ranges sold. This makes a total of 14 ranges installed. During the past winter the largest monthly bill for electric cooking has been $11.33 and the smallest $0.95. The average monthly cooking bill for the 14 customers is $3.50.

**Wireless Patrol of Transmission Lines.**—The Chattanooga Wireless Club, an amateur organization having wireless stations at Chattanooga and Cleveland, Tenn., has been of service to the Tennessee Power Company on three occasions by discovering breaks in the transmission line. The company has used an aluminum line and when this parts, the arc has made itself heard at the wireless station.

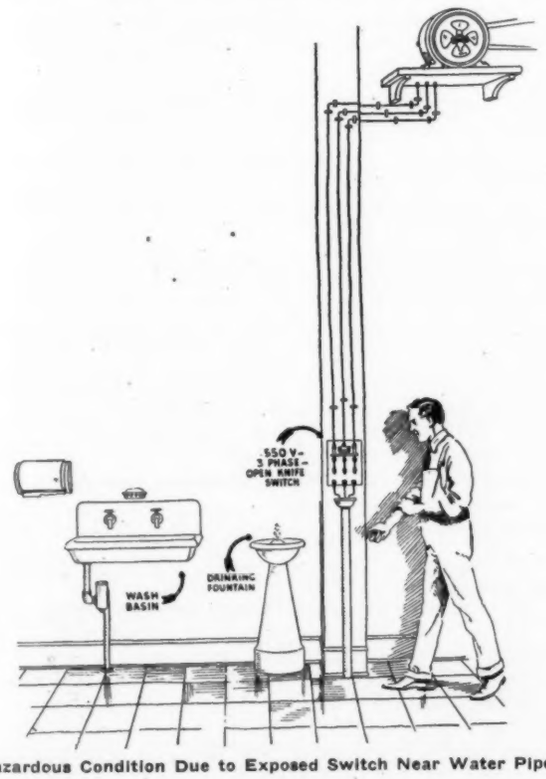
# Electrical Construction Notes

***A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment***

## Special Hazard of Open Knife Switch Near Plumbing Fixtures.

The danger of having any exposed electric wiring or switches near to wash basins, bath tubs, sinks or other plumbing fixtures, which almost invariably are well grounded, is well known to nearly all electrical men. However, instances of such careless installations occasionally come to light and should be exposed for the benefit of the public in general and the electrical fraternity in particular. A glaring case of such hazardous wiring is described in the current issue of the *Electrical Safety Magazine* as having come to the observation of a Canadian inspector.

During his tour through a factory amongst other things was found a wash basin and drinking fountain, on the wall directly above which was a 500-volt, three-wire, open knife switch. During the act of drinking from the fountain the employees would have to put their foot on a foot valve in the floor, which turned on the jet of water that rose from the drinking fountain, and in order to drink they would of necessity have to place themselves in a stooping position over the




Hazardous Condition Due to Exposed Switch Near Water Pipes.

fountain, and very naturally might feel disposed to place their hand on the wall in front of them for support. In doing so it would be almost impossible to avoid the open knife switch immediately at hand. When discovered, this drinking fountain and basin had only been installed a short time, which probably accounts for the fact that no one had been killed or seriously burned by the open switch which controlled a three-phase, 550-volt motor.

The illustration herewith shows how very easily such an accident could occur and is a very fair representation of the installation referred to. The owner of the factory was a little dubious as to the inspector's apprehension, but his doubt was soon silenced when the inspector stated that if he had any doubt about it he could very soon satisfy himself by placing his hand on the switch while taking a drink from the fountain, himself. Needless to say this challenge was not taken up and the result was that the motor switch was removed and for it there was substituted an ironclad inclosed safety switch of the "Square D" pattern.

## Emergency Substitute for Pump Motor.

By J. H. Lamoureux.

A one-horsepower, 22-volt, direct-current shunt motor, running at 1,250 revolutions per minute, was used to drive a pump furnishing water to the sixth, seventh and eighth floors of a loft building. Through lack of care the bearings were allowed to wear down until the armature rubbed on the pole pieces, bursting the band wires and burning out the armature. As no spare motor was at hand it became necessary to use a substitute motor and the nearest size motor that could be found in the shop was a two-horsepower, 550-volt, shunt-wound motor with normal speed of 2,000 revolutions per minute. It was a four-pole machine, so its fields were connected in two parallel paths and then connected across the 220-volt supply. The motor developed about 1.3 horsepower at 1,300 revolutions per minute and operated quite satisfactorily until the regular motor was repaired.

## Blackening Wrought-Iron Electric Fixtures.

By M. J. Moriarty.

Some wrought-iron electric fixtures of good quality became rusty in a golf club during the closed season. They were refinished on the job and given a rich black appearance as follows:

All the rust was cleaned off with a fine emery cloth, then the surface of each fixture was coated with a thin layer of linseed oil varnish, and this burned off over a charcoal fire without a draft. The varnish went up in smoke with a strong soot formation which also burned entirely. This coating and burning was repeated three times after which all parts exhibited a uniformly handsome deep black color. Then each part was wiped with a dry rag and repolished with a cloth dipped in linseed-oil varnish, which turned the metal to a beautiful, dull black.

**Handy Drill for Emergency Use.**—A handy drill for use in an emergency where the regular drills have been broken, lost or forgotten, can be made in a few minutes by taking a finishing nail and filing it square, then with two pairs of pliers twist it a few times, and finally sharpen it as you would an ordinary twist drill. This will drill quite a few holes in the hardest of wood. W. Morris.

# Troubles Affecting Brush Operation

## *An Outline of the Troubles That Affect Operation of Brushes or Which are Caused by Improper Brush Position, with the Principal Remedies for the Troubles*

By E. H. MARTINDALE

*Chairman, Industrial and Domestic Power Committee, A. I. E. E.*

*This is the fourth of a series of 14 articles dealing with the solution of commutator and brush troubles. The series began in the issue of March 24 and appears at intervals of two weeks. In the earlier articles the characteristics of carbon brushes were discussed. The present article gives a complete outline of brush troubles. A detailed discussion of them will be taken up in the remaining articles.*

IT IS the purpose of this article to give an outline of brush troubles together with one or more remedies. The scope of this article will not permit a detailed discussion of either the troubles or the remedies, but future articles in this series will discuss these fully and tell how to locate the causes. The outline here will be made under general headings of effects with subheadings of the causes followed by the remedies.

### Sparking.

1. Brushes off electrical neutral.—Shift to neutral by trial, or set on neutral by means of voltmeter.
2. Brushes spanning too many bars.—Trim down faces of brushes for short distance back from end or, if holders are clamp type, order thinner brushes.
3. Brush studs not parallel with the commutator bars.—Bend the brush studs or grind or shim under the bolts which fasten the studs to the yoke.
4. Incorrect brush spacing.—Check the spacing by counting the number of bars between studs or by placing a strip of paper around the commutator with divisions marked off equal to the number of studs, and correct spacing by rotating the brush studs or the brush holders on the studs.
5. Brushes tight in brush holders.—Clean the holders with gasoline and, if brushes are still tight, sandpaper them down or file out the holders carefully.
6. Brush pressure too low.—Pressure should be 1¾ to 2¼ pounds per square inch cross section for stationary motors and generators, 2½ to 4 pounds for elevator and mill motors, 3 to 5 pounds for crane motors, 4 to 7 pounds for railway motors.
7. Too low contact drop of brush.—Consult a brush manufacturer.
8. Insufficient abrasive action of brushes.—Use a commutator stone or more abrasive brushes.
9. High mica.—Use abrasive brushes, a commutator stone or undercut the mica.
10. Chattering.—See general heading "Noise" for remedies.
11. Poor adjustment of interpoles.—Consult the manufacturer of the machine.
12. Overloads.—Undercut the mica, use low-friction brushes and check up all causes for short-circuit currents (see general heading "Heating") to reduce temperatures as much as possible.
13. Open circuit in armature coil.—Rewind that part of the armature.
14. Loose end connection.—Scrape and resolder all defective connections.
15. Worn bearings.—Shim or renew the bearings.
16. Unequal air gaps.—Shim the short poles or grind off the faces of the long poles or, if from worn bearing, see paragraph above.
17. Short-circuit currents between brush studs caused by unbalanced armature winding.—Consult the manufacturer of the machine.
18. Eccentric commutator on high-speed machine.—Turn or grind.
19. Poor belt lacing.—Re-lace belt or still better use a continuous belt.
20. Pound of reciprocating engine driving the machine.
21. Unstable foundation.
22. Cross currents between generators operated in parallel driven by reciprocating engines due to variation in angular speed of engines.—Use heavier flywheel.

### Flat Spots.

1. Any form of sparking.—See above section for definite causes and remedies.
2. High bar.—Tighten the commutator bolts and turn or grind the commutator.
3. Low bar.—Use commutator stone or turn or grind the commutator.
4. Eccentric commutator on high-speed machine causing the brush to jump from the commutator at the high spots.—Turn or grind the commutator.
5. Surges of load current due to short circuit on the line or an instantaneous high peak load.
6. Mechanically unbalanced armature.—Place on balancing lathe and add weight at lightest point.
7. Difference in hardness of commutator bars.—Undercut the mica and use non-abrasive brushes.
8. Difference in hardness of mica.—Undercut the mica and use non-abrasive brushes.

### Black Commutator.

1. Sparking.—See general heading "Sparking" for causes and remedies.
2. Too much lubricant.—Clean commutator with gasoline.

### Heating.

1. Severe sparking.—See general heading "Sparking."
2. Short-circuit currents.
   - 2a—Brushes off neutral.
   - 2b—Faulty brush spacing.
   - 2c—Too thick brushes.
   - 2d—Unequal air gaps.
   - 2e—Crooked brush studs.
   - 2f—Too low contact drop of brushes.
   - 2g—Unbalanced armature winding.

   For remedies see same causes under general heading "Sparking."
3. Too high or too low brush pressure.—For recom-

mendations see paragraph 6 under "Sparking," or for more detailed discussion see the third article in this series, published in the issue of April 21, 1917.

4. High-friction brushes.—See the third article in this series, published April 21, 1917.

5. Commutator too small.—Consult the manufacturer of the machine.

6. Too high a ratio of brush area to commutator surface. —Use fewer brushes of higher carrying capacity and lower friction.

7. Overloads.—See paragraph 12 under general heading "Sparking."

8. Chattering of brushes.—See general heading "Noise."

PITTING OR HONEY-COMBING OF BRUSH FACES.

1. Short-circuit currents.—See paragraph 2 under general heading "Heating."

2. Too low brush pressure.—See paragraph 6 under general heading "Sparking."

3 Brushes of insufficient carrying capacity.—Consult a brush manufacturer.

PICKING UP COPPER.

1. Heavy short-circuit currents.—See paragraph 2 under general heading "Heating."

2. Sand under the brush faces.—Wipe brush faces carefully after sandpapering either brushes or commutator.

3. Commutator not thoroughly cleaned after turning.—Finish the surface with a commutator stone after turning.

4. Collection of coppor dust by lubricant in abrasive brushes.—Undercut the mica and use non-abrasive brushes.

5. Electrolytic action.—Change the grade of brush; better consult a brush manufacturer.

NOISE DUE TO CHATTERING.

1. High-friction brushes.—Change the grade or pressure. Also see third article in this series, published April 21, 1917.

2. Rough commutator.—Use a commutator stone.

3. Dirty commutator.—Clean with gasoline.

4. High mica.—Use a commutator stone or undercut the mica.

5. Wide slots with thin brushes.—Fill the slots with commutator cement.

6. High bars.—Tighten commutator bolts and turn or grind the commutator.

7. Flat spots.—Use a commutator stone unless the flat spots are too large for stoning, in which case turn or grind the commutator.

8. Brush operating at the wrong bevel, frequently found where brushes are operating in a stubbing position with angles of less than 20 degrees.—Change the grade of brush or angle of operation. Better consult a brush manufacturer or the manufacturer of the machine.

LOOSENING OF SHUNTS.

1. Poor workmanship in attaching shunts.

2. Insufficient carrying capacity.—Consult a brush manufacturer.

3. Heating.—See general heading "Heating."

4. Vibration.—See general heading "Noise."

5. Combination of heating and vibration.

6. Loose terminal screws causing unequal distribution of load.

7. Unequal brush pressure causing unequal distribution of load.—See that all brush pressures are uniform and conform to recommendations given in paragraph 6 under general heading "Sparking."

8. Heavy short-circuit currents between different brushes.—See subdivisions 2b, 2d, 2e and 2g under general heading "Heating."

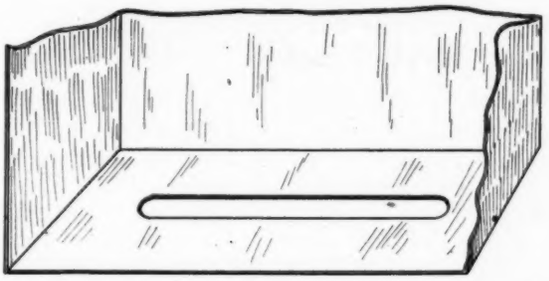
The brush manufacturers maintain well equipped engineering departments entirely for your service. Ask them to assist you.

## Totally Inclosed Wiring for Compensator Motor Starter.

BY M. W. JONES.

In wiring an induction-motor installation, a very neat construction inclosing all leads from the compensator or autotransformer motor starter to the switch and cutout cabinet may be made as follows:

Cut out a slot in the bottom of the cabinet to fit over the raised part on the top of the compensator from which the



**Slot in Bottom of Cabinet for Neat Wiring of Compensators.**

leads pass out. Rest the cabinet on top of the compensator and fasten it to the wall. This method may also be applied to some types of star-delta switches.

Where the construction of the starter does not allow mounting of the cabinet directly on its top, the cabinet may be mounted with its bottom a certain distance above the top of the compensator, using a Condulet to cover the cabinet bottom, as suggested by E. M. Raetz in the article on page 629 of the April 14 issue.

## Among the Contractors.

The Star Electric Company has been organized at Clarksburg, W. Va., with R. F. Starford as president and J. A. Callaghan secretary and treasurer. The company has opened temporary quarters in the Latsteter Building, and will do wiring and repair work. Later a line of fixtures will be carried.

Much of the success which has attended the Home Electric Company, of Louisville, Ky., established 12 years ago, is attributed to the slogan used by the concern. It is a catch-phrase which has attained much popularity and reads: "Let us YR 4 U." The business, established by Herbert F. Ottenheimer, is under his management.

G. J. Abrahamson and Harold Wing, under the firm name of the Carrington Electric Company, Carrington, N. D., have dissolved partnership. Mr. Abrahamson has become owner of the business.

J. J. Potter, of Buckley, Wash., has sold his electric wiring and supply business in that city to the Buckley Hardware Company.

Harry R. Jackson, Prudential Building, Newark, N. J., has received the contract for electrical work in the new addition to the East Side High School, Newark, at a price of $4,438. The electric lighting fixtures will be furnished by the Seton Electric & Fixture Company, 17 West Kinney Street, Newark.

Augustus L. Feeley, 6 Davis Avenue, Harrison, N. J., has been awarded a contract for electrical work in the new addition to the bottling plant of Peter Hauck & Company, Fifth Street, Harrison.

# The Dealer and Storekeeper

***An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Storekeeping for the Dealer in Electrical Appliances***

## FAN RENTALS FOR PRODUCING PROFITS AND ULTIMATE SALES.

### Plan and Schedule of Rates Used by Washington Dealer for Use of Electric Fans.

There is a great number of people who are alive to the convenience of the electric fan, but who do not feel that they can afford to purchase one, believing that the use of a fan is limited to a few months during the summer season, and that this short period of usage does not warrant the investment. Of course, the dealer cannot decide for the customer whether the latter can afford one or not, but he can get around the proposition by special inducements in order to make the sale. Many dealers and central-station companies favor deferred payment and trial plans and it seems to be general opinion that satisfactory sales results are obtained by these methods.

Another plan, which offers several advantages over the sold-on-trial plan, is that of placing fans on a rental basis. A schedule of rates that will bring in substantial profits can be prepared. A deposit covering the retail price of the fan protects the dealer from loss, though this feature, as compared with the trial or deferred payment plan, is objectionable from a sales standpoint.

Points in connection with the rental of fans are brought out in a description of plans prepared by John J. Odenwald, electrical contractor and dealer, Washington, D. C., who has prepared a schedule of rates for 1917 as follows:

| Size. | Current. | Type. | Deposit. | Rental per week. |
|---|---|---|---|---|
| 9-in. | D. C. | Swivel and trunnion desk or bracket. | $ 9.00 | $0.40 |
| 12-in. | D. C. | Swivel and trunnion desk or bracket. | 14.50 | .60 |
| 16-in. | D. C. | Swivel and trunnion desk or bracket. | 17.50 | .70 |
| 9-in. | D. C. | Oscillating desk or bracket..... | 12.50 | .50 |
| 12-in. | D. C. | Oscillating desk or bracket..... | 19.50 | .80 |
| 16-in. | D. C. | Oscillating desk or bracket..... | 21.50 | .90 |
| 9-in. | A. C. | Swivel and trunnion desk or bracket. | 10.50 | .55 |
| 12-in. | A. C. | Swivel and trunnion desk or bracket. | 16.50 | .75 |
| 16-in. | A. C. | Swivel and trunnion desk or bracket. | 18.50 | .80 |
| 9-in. | A. C. | Oscillating desk or bracket..... | 15.50 | .70 |
| 12-in. | A. C. | Oscillating desk or bracket..... | 20.50 | .85 |
| 16-in. | A. C. | Oscillating desk or bracket..... | 22.50 | .95 |

For less than ten weeks' rental of a fan an extra service charge of ten per cent of the cost of the fan to cover drayage, etc., is added to the total weekly rental; when the rental period is over ten weeks this service charge is not made. All fans are taken from new stock and cord and attachment plug furnished with each fan. Money paid for rental may be applied to the purchase price of a fan at any period.

Below is given a reproduction of the rental agreement and receipt card used by Mr. Odenwald. The right hand side of the card is filled out when the customer pays the deposit on the fan and constitutes the receipt for the money and agreement as to conditions of rental. When the fan is returned the other two forms are filled in and the dealer receives the receipt for the refund made.

**JOHN J. ODENWALD,** Original No.....
**Electrical Contractor**
**1204 H Street, N. W.**

Washington, D. C..... .....19....

**RENTAL AGREEMENT AND RECEIPT**

Received of .....

Address .....
Check)
Cash) Amounting to.....

Dollars and .....Cents ($.....)

By agreement this amount is considered a deposit on.... ...
.....type .....C. .....volt .....cycle
.....phase fan number.....

Rental of fan to be @ $.....per week ten or more weeks. Less than ten weeks @ $.....per week plus 10% of deposit $.....

It is further agreed that when the Renter returns the fan described above the amount of the accrued charges is to be deducted, then the balance of this deposit is to be paid to the Renter.

JOHN J. ODENWALD Renter.....

By.....

**DETAILS OF SETTLEMENT**

Original Deposit $.....
Rental (.....weeks) $.....
10% Charges $.....
Balance Refunded $.....

Received of .....19....
John J. Odenwald, Electrical Contractor Check)
Cash)
Amounting to .....
Dollars and .....Cents ($.....)
In full settlement of this agreement.
Renter.....

Copy of Form Used by Dealer When Placing Fans for Rental.

# Making a Drive for Electrical Business

## *Some Pertinent Reasons Why Electrical Dealers Should Employ Specialty Salesmen for Campaign Work and to Stimulate General Sales*

By G. D. CRAIN, Jr.

THE sales manager of a large electric vacuum cleaner company visited a dealer who is handling his line, and who is regarded as better than the average, as far as aggressiveness and general success are concerned.

"How many cleaners have you sold this year?" he asked the merchant.

"Six," was the reply, after the information had been looked up in the office.

"You ought to have sold fifty," said the sales manager. "If you had been getting after the business the way you might have done your profits on our cleaner would have been nearly ten times what you actually made."

"How?" asked the dealer.

That question led to numerous answers, and finally to a plan of campaign which was carried out by the dealer with the help and assistance of the manufacturer. A live salesman was put in charge of cleaner sales exclusively, for the time being, and he was given a lot of suggestions by the manufacturer's representative. Newspaper advertising and window displays were planned, and questions of direct solicitations, demonstrations, etc., were gone into thoroughly.

The result of the campaign which was put on by this store was that in the following sixty days the merchant recorded thirty sales of vacuum cleaners, and incidentally noted that business as a whole had increased, for the advertising had attracted attention to the store, people who bought cleaners had become interested in other electrical appliances, and the "big drive" on this one specialty had given stimulation and new life to many departments which had been in a comatose condition.

### Vigorous Promotion Work Brings Returns.

This is a typical case. It shows, in the first place, that even successful dealers are not getting out of their businesses all that they might, and it shows also that in order to get results from handling a line it is necessary to push it. Vigorous promotion work is needed, and unless this is done the sales are not going to materialize. Prospects may develop, but prospects and sales are two different things. Anybody can get prospects—but it takes a salesman to convert them into orders.

Everybody in the electrical business knows that his merchandise is desirable, that it serves a useful purpose, and adds to the comfort, convenience and happiness of the homes where it is used. Yet he likewise knows that comparatively little business on the larger specialties is done over the counter. He can sell fans, electric irons and smaller items of merchandise in the store, and even by telephone, but when it comes to disposing of specialties which require a considerable outlay and some demonstration, the inside selling system doesn't seem to work.

Life insurance is conceded by everybody to be a good thing. In fact, it is a necessary thing, and has saved millions of people from want after the death of their bread-winners. Yet not one policy in a hundred thousand is written as the result of the applicant coming into the office of a life insurance agent and asking for the insurance. The agents have found it necessary to go out and plug for business, and to adopt an attitude which puts the prospect on the defensive.

Yet, on the other hand, with restrictions as to the amount of business which they may write placed on the New York companies, these big institutions reach the end of the year, as a rule, with more business applied for than they can accept. In other words, in spite of the apparent difficulty of getting business, these companies actually get more than they can take care of!

If a drive on life insurance, which is hard to sell, largely because it appeals to the unselfish and altruistic side of human nature, can succeed in this way, a drive on electrical merchandise, which means a more comfortable home for the purchaser and, therefore, appeals to the selfishness which is inherent in everybody, certainly should be and always is successful. There are plenty of reasons why people should buy appliances, and it is only necessary that the dealer have these reasons explained to the prospective customer.

### Trial Use of Appliance Sells It.

Another thing is the value of getting the prospect accustomed to the idea of using an appliance. Take a washing machine, a vacuum cleaner or something of that sort, which immediately lifts a burden from the shoulders of the housewife, and makes housekeeping easier for her and her maid. When the appliance is not owned and is not in use, it seldom occurs to the housekeeper that she ought to get one. But if she once had an opportunity to use it, she would express herself through the well known bromidion, "I don't know how I ever got along without it!"

The answer to that is: Put the appliance into her home and into her hands. Let her try it—without obligation—and on the basis that the device must sell itself. After she has used it for the ten-day or other period which may have been determined upon, you couldn't get it away from her without a warrant from court. She will have seen and appreciated the advantages of the machine, and will realize that it is worth all it costs, and more.

Putting on a proposition where a free trial is involved means having facilities, first, for getting in touch with prospects personally; second, for demonstrating that appliance in the home, and, third, for following up the prospect at the end of the period, closing the sale or reclaiming the machine. In other words, a specialty man who is studying the sales kinks and is acquainted with all the details of the proposition should be trained to handle the business and to arrange all of the sales features which have to be worked out to make a sale successful.

If the store merely advertises that it will send a cleaner or a washing machine out on free trial, some requests for demonstrations will be received, but they will be relatively few in number. On the other hand, if a live salesman is following up the impression made by the advertising and is suggesting by word of mouth that the housewives permit him to make a demonstration, to be followed by a free trial, if the demonstration is satisfactory, the number of persons who will try out the plan will be greatly increased.

All of this means, of course, increased responsibility for the dealer, because he will have a considerable investment in stock which is out on trial. He must have the courage of his convictions, and must believe in the machine that he is selling. Unless he believes in it thoroughly, as a matter of fact, he ought not to sell it at all. If he does believe in it,

then he is willing to stand back of it to the extent represented by permitting the user to try out the device before purchasing it.

However, this is a feature which is often taken care of by special arrangement with the manufacturer. In the instance referred to at the beginning of this article, the vacuum-cleaner concern supplied a stock of machines which were used in connection with the campaign, the unsold portion of which was to be returned at the end of the drive. As it happened, the dealer sold more than he had expected to, and there were no returns. But close co-operation between the dealer and the manufacturer will usually make it possible for the merchant to arrange a plan of this kind without assuming all of the risk himself.

### Specialty Salesman Speeds Up Merchandising.

The essential feature of the "campaign" idea, however, is to have someone in charge who is devoting himself to a specialty. The merchant who is directing the business as a whole and who is looking after buying as well as selling, and the office as well as the store, is not in a position to get behind each individual specialty he may have in his stock, and give it the benefit of the aggressive promotion work which he may realize it should have. But if there is a man in his organization who is doing nothing but this very thing, then there can always be a campaign of some kind, with resultant benefits to that particular line and to the store at large.

The various specialties can be taken up in turn, according to seasonal and trade conditions. There is a certain live dealer in a middle western city who has shown the way to the rest of the trade by working this stunt. He has a crackerjack salesman, who burns up a lot of gasoline and wears out a lot of automobile tires getting around in person to see prospects for the various specialties which he is pushing. At one time it may be a special lighting fixture; at another an automobile specialty; then, in hot weather, he will get after the washing-machine trade, and during house-cleaning seasons, when women are thinking along this line, the vacuum cleaner is given a big boost.

When the campaign on a given specialty is on, the work of the salesman is backed up by the newspaper advertising of the dealer. That particular thing is featured. Sometimes the manufacturer agrees to spend some money on his own account advertising the product, or the cost of the space is shared by them. The window displays feature the product which is in the limelight, and all of the promotion work is dovetailed, so as to get the greatest results.

It has been found that it is a good thing to put a limit on the campaign. If thirty days constitute the special sales period, then the public is informed that during that time some special offer is being made that justifies action at once, before the campaign is over. This may be a low initial payment under an installment plan; it may involve a free trial for ten days or longer, or some other attractive offer is made that warrants the prospect in taking advantage of the offer.

After a campaign is closed, of course, the product is not forgotten, but the loose ends are gradually picked up, slow deals are closed, and business secured for a long time thereafter. Even while some new campaign is under way orders are still being taken on the device which was given the benefit of the promotion work a month or two previous.

There is always something worth selling, something with a special appeal at a given time. The way to get business; to liven up the store, to get in the business limelight in your community, is to feature that thing. Get a specialty salesman and put him to work!

## WINDOW DISPLAY SHOWS LIGHTING-FIXTURE INSTALLATIONS

During house-wiring time electrical dealers experience considerable difficulty in showing the different styles and grades of lighting fixtures that can be installed, because the customer, as a general rule, is not very familiar with such matters. The above illustration of a window display shows how the Pittsfield (Mass.) Electric Company advertised a number of the fixture installations being made by local contractors during house-wiring time. The advantages of this method of showing them are that each style can be compared with the others. The cards in each booth gave the price of the fixture installed and the name of the contractor prepared to furnish the fixture and do the work, first-hand information that is very desirable to the prospective buyer. Besides offering an aid to the customer, the display served as an excellent medium to announce that a house-wiring campaign was in progress.

# QUESTIONS AND ANSWERS

*All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be submitted preferably within eight days of the date of publication of the question and should be limited, if possible, to 300 words. Payment will be made for all answers published.*

## Questions.

No. 388.—Induction Coil for Wireless Set.—I would like to secure data for building a four-inch induction coil to be used on a small wireless set. It is to operate on 110 volts direct current, but if the primary will not stand that voltage, I can probably reduce the voltage to the required amount. I would like to find out the following: Length of primary and secondary coils; number of turns on each; number of layers on each; size of wire for each coil, and amount of wire in pounds for each; also the diameter of core. Can single cotton-covered wire be used on secondary?—R. C. S., Pontiac, Ill.

No. 390.—Good Tool Chest for Electrician.—Will some electrician who has a tool chest that he considers entirely satisfactory please give a description of it, or state where such an outfit may be bought. I should also like to know what is considered a good list of tools for an all-around electrician in an industrial plant where he has to do a "little bit of everything."—A. S. N., Plymouth, Mass.

No. 392.—Depreciation Charge and Cost of Reinstallation.—When setting aside an annual depreciation charge for replacing worn-out, obsolete or other unsatisfactory utility equipment, is it customary to provide in this charge for the cost of installing the new apparatus or other equipment, or merely for the cost of purchasing new apparatus for that thrown out? In the latter case, to what account should be charged the cost of setting and connecting the apparatus in place?—B. E. H., Maywood, Ill.

No. 393.—Maintenance of Underground Lines.—What has been the actual cost of the maintenance of underground cables, conduits, etc., for series street lighting at various voltages and different systems, exclusive of electrolier maintenance? What does this maintenance consist of?—T. S. P., San Francisco, Cal.

## Answers.

No. 384.—Design for Small Transformer.—Will some reader kindly give me the size and amount of wire to use, size of core, etc., to make a small dry-core transformer with one-to-one ratio. The secondary voltage should be 5 volts and the secondary current should be 6.6 amperes. I prefer a round core, but square one could be used; it should be as small as possible. As I sent this question in originally it implied that the ratio of transformation was 2200 volts to 5 volts. This is not what I intended, however. The transformer is to be used with a lamp of 30 to 35 watts.—W. I. C., Modesto, Cal.

In designing this transformer let it be assumed that the frequency is 60 cycles per second and let

$f$=frequency,
$N$=number of turns on primary,
$\Phi$=total flux linked with the primary turns,
$E$=voltage of supply,

then $N\Phi = E \times 10^8/(\sqrt{2} \times \pi \times f)$
$= 5 \times 10^8/(1.415 \times 3.1416 \times 60)$
$= 1{,}870{,}000.$

This is the product of the total flux and the number of turns. The number of turns $N$ may be varied within wide limits, but each change in $N$ changes the value of the exciting current in the primary at no load. Increasing the number of turns decreases the exciting current and vice-versa.

Let $N$=200 turns,
then $\Phi = 1{,}870{,}000/200$
$= 9{,}350$ lines of force.

For the transformer to operate satisfactorily on 60-cycle current the magnetic strength should not exceed 12,000 lines per square inch, thus the cross-section of core required for each coil is 9,350/12,000=0.78 square inch. If a square core is used, it should be built up of thin laminations 0.9 inch wide and insulated to 1 inch square.

For purposes of ventilation it is better to keep the number of layers down as far as possible without making the magnetic path too long.

Let the number of layers be six. To carry the current of 6.6 amperes without undue loss a No. 10 B. & S. gauge wire should be used, with single-cotton insulation. The outside diameter of this wire is about 0.12 inch. The mean length of one turn is given by
$((6 \times 0.12)+1) \times 4 = 6.88$ inches and the total length of wire required $= 6.88 \times 200/12 = 114$ feet. The resistance of 114 feet of this size wire is about 0.1 ohm.

The number of turns per layer is 200/6=33, and the length of core required to hold this wire is 4½ inches, after allowing for insulation at the ends of the coil.

If the full potential of five volts is required, turns must be added to the secondary coil winding to compensate for the voltage drop in primary and secondary. The drop in the primary is found by multiplying the resistance of the coil in ohms by the current in the circuit, or if $v$=voltage drop in both windings, $v = 6.6 \times 0.1 + 6.6 \times 0.11 = 1.38$ volts. Now the volts drop per turn in the primary winding is given by 5/200=0.025 and the number of turns required to compensate for the voltage drop is given by 1.35/0.025=55. Thus the secondary will have 255 turns. This will give a no-load voltage of $5 \times 225/200 = 6.35$ volts.

The total quantity of wire required is 270 feet of No. 10 B. & S. gauge single cotton-covered copper wire.

The primary and secondary are to be wound upon separate cores, each core being 0.9x0.9x4½ inches, these cores to be magnetically connected together at the ends with laminated end pieces which are 1x1x4 inches long. The joints must be pressed firmly to insure good contact and low reluctance.

The foregoing should enable the builder of the transformer to vary the design to suit his own personal tastes.—J. H. McI., Sharon, Pa.

No. 391.—Test for Live Cables.—Will some one inform me of a method by which I can tell when a high-voltage (4600 or 2300-volt) underground line is closed at the sending end only. It is necessary to make repairs to these lines occasionally and the method must be of such a nature as to be used in a manhole. Charging current only will be flowing on the line so that the same test as when the cable is closed at both ends fails here. There are several other similar cables in parallel duct runs and all carrying load.—L. F. C., Detroit, Mich.

A simple device by means of which one may detect very small currents in high-tension cables can be made as follows: Secure some laminations from an old transformer and make a U-shaped core with square arms ½ by ½ by 3 inches joined by a square base ½ by ½ by 4 inches. Interleave the corners as in building up a transformer core. Across the open ends of this U-shaped core is to be placed a square, laminated armature ½ by ½ by 4 inches, one end being hinged and the other end arranged with a catch, so that when in place the entire core forms a closed magnetic circuit. The entire core may be covered with tape except at the junctions where the armature fits on. Around the base portion an extra layer of tape is wound and over this is wound a coil of about 500 turns of No. 30 single-silk covered copper magnet wire, bringing out the terminals to binding posts fastened on the side legs of the core. Then treat the coil with shellac. Secure a head-type telephone receiver and connect it to the binding posts referred to. To operate this device place the core so as to encircle the cable being tested, and place the telephone receiver to the ear. If the cable is "alive" a vibrating sound will be heard. If the cable is "dead," nothing will be heard. The details of the test coil and device may be varied.—A. J. T., Mosinee, Wis.

# New and Novel Appliances

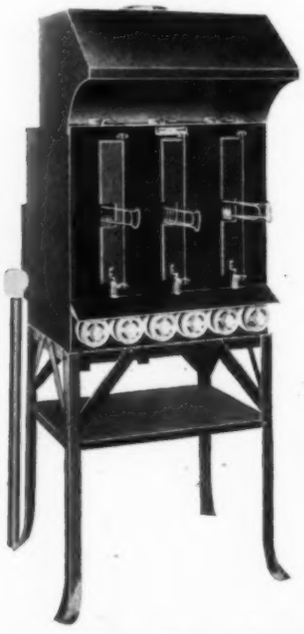
***A Review of the Latest Developments and Information Respecting Electrical and Kindred Mechanical Appliances***

## New Hughes Electric Heating Appliances.

In line with its policy of adding to its already extensive assortment of electric ranges and other heating appliances, the Hughes Electric Heating Company, 5660 West Taylor Street, Chicago, is placing on the market a new electric kitchenette range which has been especially designed for the one, two and three-room apartments that are coming into considerable vogue in the larger cities. This range, as shown in the accompanying illustration, is extremely compact and is especially intended for setting into a section of the so-called cabinet or in-a-wall type kitchen. With this arrangement all of the appliances and supplies needed in cooking are handy and arranged to take up a minimum amount of space.

This new range has two cooking-surface units and a medium-sized oven. The units on the cooking surface are rated at 500 and 1,100 watts maximum. The oven has two units—one at the top and one at the bottom—each consuming 660 watts maximum. The maximum possible load is 2920 watts.

The company has also added to its line of ovens, ranges, etc., for hotels, clubs and restaurants, a new device known as a vertical type hotel broiler. This is especially designed for large establishments where there is a large demand for broiled meats. This broiler applies a very intense heat which sears the surface of the meat instantly and thereby retains



Hughes Vertical-Type Hotel Broiler.

practically all of the juices, thus making a very delicious dish. Both sides of the meat are broiled at the same time. The device has three separate broiling compartments so that three kinds of fish or meat can be broiled simultaneously without interchanging odors or flavors. Each compartment consumes five kilowatts or two and one-half kilowatts per unit and the total maximum load is 15 kilowatts. The walls of the outfit are heavily insulated to conserve the heat. Each

Hughes Electric Kitchenette Range.

heating unit is controlled by a separate three-heat switch so as to secure complete control of whatever heat is desired. Three broiling racks are provided for holding the food being broiled.

## Vibrating-Reed Slip Indicator.

By means of the device illustrated it is now possible to determine the slip of induction motors by a new and improved method. This device has been developed and is being used by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. It is known as a vibrating-reed slip indicator and consists essentially of a stand upon which is mounted a gear box, a rotating slotted disk, an electromagnetic vibrator with steel reed, the necessary resistance, and a lamp for illumination purposes.

The gear box consists of three sets of pinions by means of which the disk may be driven at various ratios with respect to the speed of the motor under test. The pinions are marked 0, 4 and 8, these numbers indicating the per cent slip at which the vibrating reed will be seen to apparently stand still when the rotating disk is driven through the gears.

The disk is arranged to be driven mechanically from the motor under test through a short flexible shaft and separable coupling with sleeve, so that the indicator may be attached and detached to the driving shaft of the motor while running.

Five disks are furnished with each indicator, each having a different number of slots. A disk corresponding to the number of poles of the machine being tested, or an even factor of them must be used. Thus, for two and four-pole machines a two-slot disk should be used, a six-slot disk for 6, 12 and 18-pole machines, and so on.

In starting a test the gear box must be lined up with the motor shaft. The vibrator is then lowered until the reed can be seen through the slots in the rotating disk. The effective

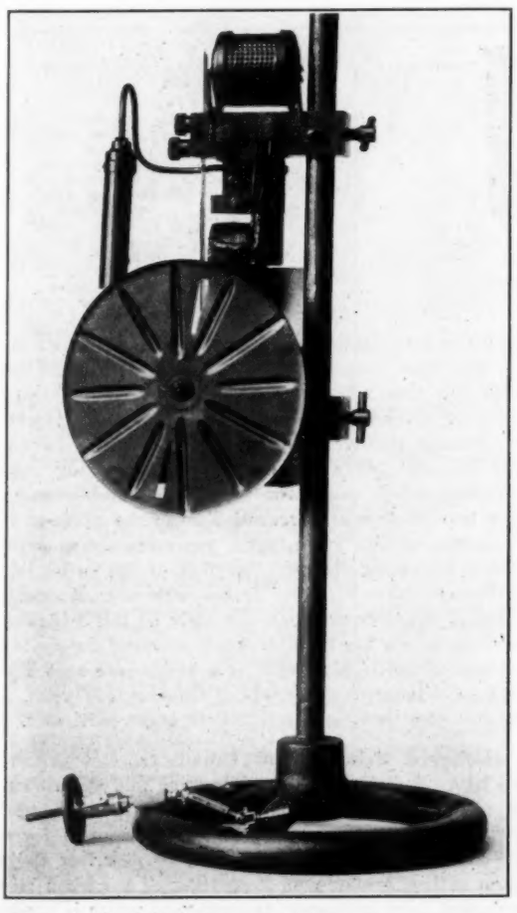
length of the steel reed may be varied so that its natural period of vibration will correspond to that of the circuit. Under such conditions, the vibrations of the reed will be free and uniform. Marks on the reed indicate the 25 and 60-cycle positions. Positions corresponding to other frequencies may be found readily by shifting the reed up and down until the vibrations become normal.

When the motor under test is operating on a 110-volt circuit the electromagnet of the vibrator is excited from the same circuit. When, however, the motor is operating on higher voltages the magnet is excited from the 100-volt secondary of a potential transformer whose primary leads are connected across one phase of the same circuit on which the motor under test is operating.

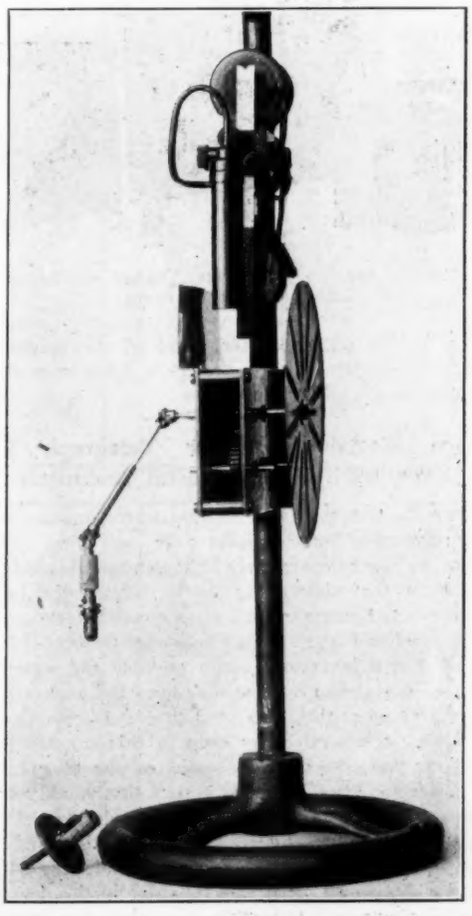
In operation, the reed is observed through the slots in the rotating disk. When the disk is driven direct, with the motor running at synchronous speed, a view of the reed will be obtained a certain number of times per revolution. If the number of slots in the disk is an integral factor of the number of poles of the machine under test, the reed will be seen in the same position each time. That is, it will be seen to apparently stand still. If the motor is operating at a speed slightly different from synchronous, the reed will be seen in a different position at each revolution of the disk, when it will apparently oscillate from side to side similarly to a pendulum.

As the reed vibrates in synchronism with the circuit, the apparent oscillations will correspond to the alternations slip. The effect will be the same whether the speed is above or below that of synchronism. The rate then of the apparent oscillations of the reed is a definite measure of the slip. A complete oscillation corresponds to one alternation slip, and when the disk is direct connected to the motor the number of these apparent oscillations per minute divided by the frequency of the circuit is equal to the per cent slip. When the disk is driven through the gears the per cent slip is equal to the marking on the pinion (0, 4 or 8) to which the motor is connected, plus or minus the per cent slip as determined above. Whether the sign is plus or minus may be ascertained readily by noting the change in the rate of oscillations with change in load. The actual revolutions may be readily computed from the known frequency of the circuit and the per cent slip, and by the use of a frequency meter in conjunction with the indicator, the revolutions per minute of the motor may be obtained with greater accuracy than by the use of a speed counter.

The greater the slip of the motor under test the greater will be the number of apparent oscillations of the speed. As the slip increases, the oscillations will become so rapid as to be impossible to count accurately. It has been found possible, however, to count oscillations up to a rate of 150 per minute with an error not greater than two-fifths of a second. In the case of a 60-cycle motor this would correspond to a slip of 2.08 per cent. As a large proportion of induction motors are built for 60-cycle operation and have a percentage slip varying from two to eight or more, the use of a device such as the indicator would be very limited if the disk could only be driven direct from the motor shaft. If, by means of some intermediate element, such as a gear, the rotating disk can be speeded up a definite amount, say four per cent, then the disk will revolve synchronously and the reed will be seen to apparently stand still when the motor has a slip of exactly four per cent. This value may then be taken as a new point of reference and the slip in alterations, up to 150 per minute may again be counted. This constitutes the whole function of the gear box.



Front View of Indicator.



Side View of Indicator.

## The Neuco Electric Kitchenette.

The Neuco electric kitchenette, shown in the accompanying illustration, is an ingenious cooking unit especially designed to meet the demand for a combination electric range in compact form for the small apartment, kitchenette and buffet. It is manufactured by the National Electric Utilities Corporation, 103 Park Avenue, New York City, and embodies all of the features of durability and reliability of this company's standard range, and performs all the necessary functions of the full-sized unit.

The electric kitchenette consists of two compartments, a broiler shown in the center of the illustration and an oven shown to the right. The source of heat is the Neuco heat unit, an electric grid, which is permanently placed in the upper section of the broiler. The heat is confined and thrown downward by means of a baffle plate or reflector placed on top and which, for convenience, is fitted with a handle.

When used for boiling, the baffle plate is placed in a slide underneath the heat unit, inside the broiling compartment, thereby concentrating the heat to the top surface, while the plate with circular lid is placed on top. By keeping the circular plate in position, the entire top is transformed into a griddle with an evenly distributed heat. For baking and roasting, the baffle plate remains in place inside the broiler and the oven is substituted for the top plate and lid. The oven is double-walled and well insulated, thereby insuring economy in operation.

The unit is equipped with a three-heat snap switch conveniently placed on the lower panel of the broiler. The wattages for the three heats are 2,000, 1,000 and 500 watts respectively.

The Neuco Electric Kitchenette, Ready for Broiling—Oven Shown at Right.

## Western Electric Multiplex Telegraph System Endorsed by British Postal Committee.

When the telegraph was first put to commercial use, only one message at a time was sent over each wire. This was adequate for the comparatively light demands made upon the telegraph at that time. But as its advantages for rapid communication became more fully appreciated, telegraph engineers developed the simplex and the duplex systems of circuits. These inventions made possible the simultaneous sending of more than one message over the same wire.

In recent years there has been an ever-increasing demand on the telegraph service not only in this country but also abroad. It was, therefore, required of the telegraph engineers to develop some device or system that would make possible a more intensified use of the telegraph wires.

After a thorough and patient investigation, and careful and scientific experiments a modern multiplex printing telegraph was developed. America, as chief in the development of the telephone and telegraph, has taken the lead in this printing-telegraph development work. It is with no little interest that we note in a recent issue of our British contemporary, *The Electrical Review*, published in London, that a special committee appointed by the British Postmaster-General has favorably endorsed the high-speed multiplex telegraph system designed and built by the Western Electric Company, Incorporated. This committee, which consisted of prominent post-office officials and leading electrical engineers, was appointed at the beginning of 1914.

The committee arrived at its conclusion after a most painstaking investigation, and after having reviewed the merits of various telegraph systems that had been tried in the British provinces during the last decade. As a practical experiment during the committee's study, a complete quadruple-duplex installation of Western Electric multiplex equipment was made on a circuit between London and Manchester. It is quite interesting to Americans to know that the report of the committee states that this Yankee invention has handled at least two-thirds of the entire telegraphic traffic between London and Manchaster over a single telegraph circuit. *The Electrical Review* in summing up the leading conclusion of the committee says in part: "Of the multiplex systems at present available, the Western Electric has given the best results."

## Improved Bryant Straight-Through Switch.

The most convenient method of controlling the current which operates portable electrical devices is by means of a switch connected into the conducting cord, which is commonly known as a straight-through or a feed-through switch. Such a device, manufactured by the Bryant Electric Company, Bridgeport, Conn., has recently been redesigned with a resultant improvement in mechanical and electrical features.

New Bryant Feed-Through Switch.

Although the over-all measurements of this switch have been reduced, the current-carrying and breaking capacities are greater. The mechanism proper is securely mounted between two substantial porcelain blocks; the make-and-break mechanism, of the knife-switch character, being well protected in the center thereof. The shell of this switch is of the well known "New Wrinkle" design with interchangeable cap, so that if desirable the shell and body of this switch will fit into a cap which has been threaded onto and rigidly fastened to metal tubing. This switch is a single-pole switch with a rating of 6 amperes, 125 volts, 3 amperes, 250 volts, and is National Electrical Code standard in every particular.

**Hickey & Schneider**, 61 Broadway, New York City, have issued bulletin No. 20, illustrating and describing their line of tools for maintenance of high-tension live lines. These include insulator changers and accessories for use in connection with them. Bulletin No. 50 describes the Burn-Boston carbon ground-cone consisting of a carbon electrode surrounded by a carbonaceous compound which is porous and absorbs moisture.

# Specifications of Electric Ranges for Household Use

***General Specifications of the Principal Types of Electric Ranges for Use in General Household Cooking, as Made by the Leading Manufacturers of Electric Cooking Equipment***

**Estate Electric No. 83.**

Three-unit cooking top with single oven below. White enamaled oven-door panel with thermometer. All heating units three-heat and ironclad, except broiling unit in oven top.
Cooking top.....15x29 in.
Bake oven.....18x12x12 in.
Over-all size.....17x29 in.
Over-all height.....33 in.
Two top units, 6½ in. diam. each.....650, 325, 165 watts
One top unit, 8 in. diam.....1200, 600, 300 watts
Top oven unit, broiling radiant type.1030, 515, 250 watts
Bottom unit in oven.....1370, 685, 345 watts
Maximum possible load.....4.9 K. W.
The Estate Stove Company, Hamilton, Ohio.

**Estate Electric No. 88.**

Four-unit cooking top with oven at right side. High shelf and leg shelf, also small side shelf. White enameled splashers back and side. Thermometer in oven-door panel.
Cooking top.....22x25 in.
Bake oven.....18x12x12 in.
Over-all size.....25x50½ in.
Over-all height.....47 in.
Three top units, 6½ in. diam. each .....650, 325, 165 watts
One top unit, 8 in. diam.....1200, 600, 300 watts
Top oven unit (broiling).....1500, 750, 375 watts
Bottom oven unit.....2000, 1000, 500 watts
Maximum possible load.....6.65 K. W.
The Estate Stove Company, Hamilton, Ohio.

**Estate Electric No. 84.**

Four-unit cooking top with elevated bake and broiling ovens at right. High, side and leg shelves. White enameled splasher back.
Cooking top.....22x25 in.
Bake oven.....18x18x12 in.
Broiling oven.....18x18x6 in.
Over-all size.....25x50½ in.
Over-all height.....58 in.
Three top units each.....650, 325, 165 watts
One top unit.....1200, 600, 300
Bake oven units:
Top.....1500, 750, 375 watts
Bottom...2000, 1000, 500 watts
Broiling oven unit.....1500, 750, 375 watts
Maximum possible load.....8.15 K. W.
The Estate Stove Company, Hamilton, Ohio.

**G-E Type S-1-2.**

Three-unit cooking top with oven below and shelf above. All units of three-heat and sheathed-wire type, inclosed for surface hot plates. Side receptacle for portable devices.
Cooking top .....24½x31½ in.
Oven .....18x12x18 in.
Floor space.....27½x34½ in.
Over-all height .....53½ in.
Three top units....8 in. diam., each.....1000, 500, 250 watts
Top oven unit, for broiling.....1500, 750, 375 watts
Bottom oven unit.....800, 400, 200 watts
Maximum possible load.....5.3 K. W.
Type S-2-2 is similar, but has oven elevated instead of shelf.
General Electric Company, Schenectady, N. Y.

**G-E Type K-5-1.**

Four-unit cooking top with oven below and shelf above. Has side receptacle for portable devices, cleanout pan under cooking top, latching oven door with white panel and thermometer, nickel trimmings. Cooker can be substituted for a rear hot plate.
Cooking top .....24½x35 in.
Oven .....18x14x18 in.
Floor space .....29x35 in.
Over-all height .....55 in.
Four top units, 8 in. diam., each.....1000, 500, 250 watts
Top oven unit (broiler).....1500, 750, 375 watts
Bottom oven unit.....800, 400, 200 watts
Maximum possible load.6.3 K.W.
General Electric Company, Schenectady, N. Y.

**G-E Type KR-10-1.**

Four-unit cooking top with oven at right or left side and large plate shelf inclosed by door below oven. Side and top shelves.
Cooking top .....24½x30 in.
Oven .....18x14x18 in.
Floor space .....29x54 in.
Over-all height .....48 in.
Four top units, 8 in. diam., each.....1000, 500, 250 watts
Top oven unit (broiler).....1500, 750, 375 watts
Bottom oven unit.....860, 400, 200 watts
Maximum possible load.....6.3 K. W.
Type K-20 is similar but has 3-heat broiling closet instead of inclosed plate shelf.
General Electric Company, Schenectady, N. Y.

**G-E Type K-70-1.**

Two-unit cooking top with oven below and shelf above. Side receptacle for portable devices. White enameled oven-door panel with thermometer.
Cooking top .....17½x25½ in.
Oven .....12x18x12 in.
Floor space .....21x25¾ in.
Over-all height .....51½ in.
Top units, one 6 in., one 8 in. diam., each 1000, 500, 250 watts
Top oven unit, for broiling.....1200, 600, 300 watts
Bottom oven unit.....1200, 600, 300 watts
Maximum possible load.....4.4 K. W.
General Electric Company, Schenectady, N. Y.

**G-E Type SL-3-2.**

Four-unit cooking top with oven at left or right side and warming closet with sliding door above oven. Leg, side and high shelves and small canopy. Side receptacle. Cooker furnished in place of a rear hot plate, if desired.
Cooking top .....24½x30 in.
Oven .....18x12x18 in.
Floor space.....24x45½ in.
Over-all height .....57½ in.
Four top units, 8 in. diam., each.....1000, 500, 250 watts
Top oven unit (broiler).....1500, 750, 375 watts
Bottom oven unit.....800, 400, 200 watts
Maximum possible load.....6.3 K. W.
General Electric Company, Schenectady, N. Y.

**G-E Type KR-30-1.**

Four-unit cooking top with oven at right or left side, broiling closet below oven and warming closet above oven. Side and high shelves, and canopy at top. Side receptacle.
Cooking top .....24½x30 in.
Oven .....18x14x18 in.
Broiling closet .....18x10x18 in.
Floor space .....29x54 in.
Over-all height .....56 in.
Four top units, 8 in. diam., each.....1000, 500, 250 watts
Bake oven units:
Top.....1500, 750, 375 watts
Bottom.....800, 400, 200 watts
Broiling closet unit.....1500, 750, 375 watts
Maximum possible load.....7.8 K. W.
General Electric Company, Schenectady, N. Y.

**G-E Type KR-60-1.**

Six-unit cooking top with two large ovens above each other at right or left side. Large range with high shelf.
Cooking top .....24½x39½ in.
Ovens, each .....18x14x18 in.
Floor space .....24½x62 in.
Over-all height .....52 in.
Two top units, 8 in. diam., each.....1500, 750, 375 watts
Four top units, 8 and 6 in., each.....1000, 500, 250 watts
Units in each oven:
Top.....1500, 750, 375 watts
Bottom.....800, 400, 200 watts
Maximum possible load.....
.....11.6 K. W.

Type KR-65-1 is similar but has warming closet and canopy added at top.

General Electric Company, Schenectady, N. Y.

**Globe Electric No. A-4.**

Four-unit cooking top with small side shelves and oven below. Switches for top units below side shelves, for oven below oven. All surfaces white-enameled or highly nickeled. Top units of semi-enclosed type. Swiveling casters.
Cooking top .....17¾x22 in.
Oven .....11½x19¾x13 in.
Over-all size .....22x24 in.
Over-all height .....30½ in.
Four top units, 6 in. diam., each.....880 watts
Oven units, top and bottom, each.....1000, 500, 250 watts
Maximum possible load.....
.....5.52 K. W.

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. A-3.**

Four-unit cooking top with oven at right end. Leg shelf and high shelf. All switches and pilot light in front apron. Finish entirely white-enameled and nickel-plated. Mounted on casters. Hand rail at each end.
Cooking top .....21½x22¾ in.
Oven .....11½x19¾x13 in.
Over-all size .....24x45 in.
Over-all height .....48½ in.
Two top units, 6 in. diam., each.....880 watts
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Oven units, top and bottom.. each.....1000, 500, 250 watts
Maximum possible load.....
.....5.96 K. W.

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. A-2.**

Four-unit cooking top with two ovens below. High shelf. Switches, pilot light and two receptacles in splasher back. All white-enameled and nickeled.
Cooping top .....20½x42 in.
Large oven ....19¼x19¾x13 in.
Small oven ....11½x19¾x13 in.
Over-all size .....25x46¼ in.
Over-all height .....42½ in.
Two top units, 6 in. diam., each .....880 watts
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Large oven units:
Top.....1000, 500, 250 watts
Bottom....2000, 1000, 500 watts
Small oven units..... each.....1000, 500, 250 watts
Maximum possible load.8.96 K.W

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. B-1.**

Five-unit cooking top with simmering unit in center and oven below. High shelf and enameled splasher back. Enameled and nickeled oven door.
Cooking top .....24x27 in.
Oven .....13¼x19¼x13½ in.
Over-all size .....24x28 in.
Over-all height .....55 in.
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Two top units, 6 in. diam., each .....880 watts
Simmering unit .....550 watts
Oven units, top and bottom, each.....1000, 500, 250 watts
Maximum possible load.....
.....6.5 K. W.

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. B-2.**

Five-unit cooking top with simmering unit in center and oven elevated at right side. High shelf and enameled splasher back. Enameled oven door. Nickel trimmings. Resembles No. A-3, but has less enamel and nickel.
Cooking top .....22½x24 in.
Oven .....13¼x19¼x13½ in.
Over-all size .....24x43½ in.
Over-all height .....49 in.
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Two top units, 6 in. diam., each .....880 watts
Simmering unit .....550 watts
Oven units, top and bottom, each.....1000, 500, 250 watts
Maximum possible load.6.5 K.W.

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. C-1.**

Two-unit cooking top with oven directly below, consisting of hot plate and oven sections superposed.
Cooking top .....12x20 in.
Oven .....12x12x18 in.
Over-all size .....12x20 in.
Over-all height .....32 in.
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Oven units:
Top.....500, 250, 125 watts
Bottom.....1000, 500, 250 watts
Maximum possible load.....
.....3.7 K. W.

Type No. C-3 consists of two No. C-1 sections side by side as a double range.

Type No. C-4 is same as No. C-3, but with short legs.

The Globe Stove & Range Co., Kokomo, Ind.

**Globe Electric No. C-2.**

Two-unit cooking top with oven at right or left side. Leg shelf and high shelf.
Cooking top .....12x20 in.
Oven .....12x12x18 in.
Over-all size .....12x42 in.
Over-all height .....42 in.
Two top units, 8 in. diam., each.....1100, 550, 275 watts
Oven units:
Top.....500, 250, 125 watts
Bottom.....1000, 500, 250 watts
Maximum possible load.....
.....3.7 K. W.

Type No. C-6 is same as No. C-2, but with short legs.

Type No. C-5 is same as No. C-6, but with additional two-unit hot-plate section on top of oven.

The Globe Stove & Range Co., Kokomo, Ind.

**Hotpoint Model D.**

Four-unit cooking top with elevated bake oven and warming closet at right side.. Leg, side and high shelves. Side receptacle for portable devices. Enameled splasher walls and oven-door panels.
Cooking top .....25x26½ in.
Bake oven ...18½x18½x11½ in.
Warming closet ..18½x18x10 in.
Floor space .....26x56 in.
Over-all height .....55 in.
Cooking-top units:
One.....1500, 750, 375 watts
One.....1200, 600, 300 watts
Two, each..800, 400, 200 watts
Oven units, top and bottom, each.....1200, 600, 300 watts
Maximum possible load.....
.....6.7 K. W.

Hotpoint Electric Heating Co., Ontario, Cal.

**Hotpoint Model E.**

Three-unit cooking top with elevated bake oven and warming closet at right side. Leg, side and high shelves. Side receptacle for portable devices. Similar to Model D, but smaller in capacity and size.
Cooking top .....22½x24½ in.
Bake oven .....16½x16x11 in.
Warming closet.12½x16x10¼ in.
Floor space .....26x49 in.
Over-all height .....54 in.
Cooking-top units:
One.....1500, 750, 375 watts
One.....1200, 600, 300 watts
One.....800, 400, 200 watts
Oven units, top and bottom, each.....1200, 600, 300 watts
Maximum possible load.....
.....5.9 K. W.

Hotpoint Electric Heating Co., Ontario, Cal.

**Hotpoint Model F.**

Three-unit cooking top with elevated oven in place of high shelf. Small shelf at each side, and leg shelf. Side receptacle for connecting portable appliances.
Cooking top .....25x26½ in.
Oven .....18½x16x11½ in.
Floor space .....31x38½ in.
Over-all height .....64 in.
Cooking-top units:
One.....1500, 750, 375 watts
One.....1200, 600, 300 watts
One.....800, 400, 200 watts
Oven units, top and bottom, each.....1200, 600, 300 watts
Maximum possible load.....
.....5.9 K. W.

Hotpoint Electric Heating Co., Ontario, Cal.

**Hotpoint Model G.**

Three-unit cooking top with oven underneath and small shelf at each side.
Cooking top .....25x26½ in.
Oven .....18½x16x11½ in.
Floor space .....25x40½ in.
Over-all height .....34 in.
Cooking-top units:
One.....1500, 750, 375 watts
One.....1200, 600, 300 watts
One.....800, 400, 200 watts
Oven units, top and bottom, each.....1200, 600, 300 watts
Maximum possible load.....
.....5.9 K. W.

Also furnished with high shelf and white splasher back, if desired.

Hotpoint Electric Heating Co., Ontario, Cal.

**Hotpoint Model H.**

Two-unit cooking top with oven below. Two side shelves, high shelf and splasher back. Plug receptacle for connecting portable appliances. Lighter construction than the more expensive Hotpoint models listed on preceding page.

Cooking top .....17x25 in.
Oven .....16½x14x11 in.
Floor space .....17x41 in.
Over-all height .....54 in.
Cooking top units:
One.....1500, 750, 375 watts
One.....800, 400, 200 watts
Oven units:
Top.....1200, 600, 300 watts
Bottom.....1000, 500, 250 watts
Maximum possible load.....
.....4.5 K. W.

Hotpoint Electric Heating Co., Ontario, Cal.

**Hughes No. 60.**

Six-unit cooking top with broiling compartment, oven and warming closet at end. Two shelves. Plain or nickel finish.

Cooking top .....23½x35 in.
Bake oven .....18x18x12 in.
Broiling oven .....18x18x18 in.
Floor space .....27¼x59½ in.
Over-all height .....67 in.
Cooking top units:
One .....1500, 750, 375 watts
Two, each.1100, 550, 275 watts
Two, each..880, 440, 220 watts
One .....500 watts
Oven units, top and bottom, each .....1100, 550, 275 watts
Broiling unit.1800, 900, 450 watts
Max. possible load....9.96 K. W.

No. 56 is similar to No. 60, but has only 4 top units.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 50.**

Four-unit cooking top with oven and warming closet at one end. High shelf and leg shelf. Plain or nickel finish, with white enameled splashers.

Cooking top .....23½x27 in.
Oven .....18x18x12 in.
Warming closet....21¼x20x9 in.
Floor space .....27½x51 in.
Over-all height .....58 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....1100, 550, 275 watts
One .....880, 440, 220 watts
One .....500 watts
Oven units, top and bottom, each .....1100, 550, 275 watts
Max. possible load....5.68 K. W.

No. 47 is similar to No. 50, but has only 3 top units.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 44.**

Four-unit cooking top with elevated oven and leg shelf. Plain or nickel finish.

Cooking top .....24¼x26½ in.
Oven .....18x18x12 in.
Floor space .....30½x32¼ in.
Over-all height .....65 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....1100, 550, 275 watts
One .....880, 440, 220 watts
One .....500 watts
Oven units, top and bottom, each .....1100, 550, 275 watts
Max. possible load...5.68 K. W.

No. 33 is similar to No. 44, but has only 3 top units and a smaller oven. Maximum possible load, 4.86 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 48.**

Six-unit cooking top with oven underneath. Furnished with high shelf, if desired.

Cooking top .....23¼x33 in.
Oven .....18x18x12 in.
Floor space .....27½x34½ in.
Height (with shelf).....58 in.
Cooking top units:
One .....1500, 750, 375 watts
Two, each.1100, 550, 275 watts
Two, each..880, 440, 220 watts
One .....500 watts
Oven units, top and bottom, each .....1100, 550, 275 watts
Max. possible load...8.16 K. W.

No. 40 is similar to No. 48, but has only 4 top units.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 37.**

Three-unit cooking top with oven below. Furnished with high shelf, if desired.

Cooking top .....22½x28¼ in.
Oven .....18x18x12 in.
Floor space .....27x29½ in.
Height (with shelf).....58 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....1100, 550, 275 watts
One .....500 watts
Oven units, top and bottom, each .....1100, 550, 275 watts
Max. possible load...5.3 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 30.**

Three-unit cooking top with units in a row and oven underneath. Furnished with high shelf, if desired.

Cooking top .....14¼x33 in.
Oven .....18x12x12 in.
Floor space .....20x34½ in.
Height (without shelf)....34 in.
Cooking top units:
One .....1100, 550, 275 watts
One .....1500, 750, 375 watts
One .....500 watts
Oven units, top and bottom, each .....880, 440, 220 watts
Max. possible load...4.86 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. 27.**

Two-unit cooking top with oven below. Furnished with high shelf, if desired.

Cooking top .....14x25 in.
Oven .....18x12x12 in.
Floor space .....20x27 in.
Height (with shelf).....58 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....880, 440, 220 watts
Oven units, top and bottom, each .....880, 440, 220 watts
Max. possible load...4.14 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. C4.**

Three-unit cooking top with oven at end. Cabinet type. High shelf and leg shelf. Plain black finish.

Cooking top .....22¾x24½ in.
Oven .....18x18x12 in.
Floor space .....26x49½ in.
Over-all height .....54 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....1100, 550, 275 watts
One .....500 watts
Oven units ..1100, 550, 275 watts
Max. possible load....5.3 K. W.

No. C3 is similar to No. C4, but has smaller oven (18x18x12 in.) with two units, each 880, 440, 220 watts.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. C2.**

Two-unit cooking top with oven at end. Cabinet type. High shelf and leg shelf. Plain black enamel finish.

Cooking top .....18x23 in.
Oven .....18x12x12 in.
Floor space .....26x36½ in.
Over-all height .....54 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....880, 440, 220 watts
Oven units, top and bottom, each .....880, 440, 220 watts
Max. possible load...4.14 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. C18.**

Two-unit cooking top with oven underneath. High shelf furnished, if desired. Plain black enamel finish.

Cooking top .....14x25 in.
Oven .....18x12x12 in.
Floor space .....18x25 in.
Height (with shelf).....58 in.
Cooking top units:
One .....1500, 750, 375 watts
One .....880, 440, 220 watts
Oven units, top and bottom, each .....880, 440, 220 watts
Max. possible load...4.14 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Hughes No. C1.**

Two-unit cooking top with oven at right end. Kitchenette type with legs one inch long. Black enamel finish.

Cooking top .....15x21 in.
Oven .....10x10x12 in.
Over-all size .....16x33 in.
Over-all height .....22 in.
Cooking top units:
One .....1100 watts
One .....500 watts
Oven units, top and bottom, each .....660 watts
Max. possible load...2.92 K. W.

Hughes Electric Heating Co., Chicago, Ill.

**Garland Electric Model 21.**

Two-unit cooking top with oven built in below. Short legs. Furnished with or without high shelf and splasher back.
Cooking top .....18x22½ in.
Oven .....18x12x12 in.
Floor space .....21x22½ in.
Height of cooking top.....31 in.
Two cooking-top units.....
each .....1200, 600, 300 watts
Oven unit...1200, 600, 300 watts
Max. possible load....3.6 K. W.
Model 20 is without oven.
Model 23 is combination of Models 20 and 21 side by side, with oven section at either side, thus giving 4 top units and maximum load 6.0 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 27.**

Two-unit cooking top with oven elevated in place of high shelf. Leg shelf supplied. Oven door with white enamel panel and thermometer.
Cooking top .....18x22½ in.
Oven .....18x12x12 in.
Floor space .....22½x26 in.
Height of cooking top.....27 in.
Two cooking-top units.....
each .....1200, 600, 300 watts
Oven units, top and bottom,
each .....1200, 600, 300 watts
Max. possible load....4.8 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 26.**

Two-unit cooking top with oven at right or left end. Cabinet type. High shelf and leg shelf. Enameled splasher walls and oven-door panel.
Cooking top .....18x22½ in.
Oven .....18x12x12 in.
Floor space .....20½x45 in.
Height of cooking top.....31 in.
Two cooking-top units.....
each .....1200, 600, 300 watts
Oven units, top and bottom,
each .....1200, 600, 300 watts
Max. possible load....4.8 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 31.**

Three-unit cooking top with oven built in below. Short legs. With or without high shelf and splasher back.
Cooking top .....18x30½ in.
Oven .....18x12x12 in.
Floor space .....20½x30½ in.
Height of cooking top.....31 in.
Three cooking-top units.....
each .....1200, 600, 300 watts
Oven unit...1200, 600, 300 watts
Max. possible load....4.8 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 35.**

Six-unit cooking top with oven built in below each end. This is practically two Model 21 sections with Model 20 between them, making a desk-type combination.
Cooking top .....:18x61 in.
Ovens, each .....18x12x12 in.
Floor space .....20½x62¼ in.
Height of cooking top.....31 in.
Six cooking-top units.....
each .....1200, 600, 300 watts
Oven units, one in each.....
.....1200, 600, 300 watts
Max. possible load....9.6 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 36.**

Three-unit cooking top with oven at right or left end. Cabinet type. High shelf and leg shelf. White enameled splashers and oven-door panel.
Cooking top .....18x30½ in.
Oven .....18x12x12 in.
Floor space .....20½x53½ in.
Height of cooking top.....31 in.
Three cooking-top units.....
each .....1200, 600, 300 watts
Oven units, top and bottom,
each .....1200, 600, 300 watts
Max. possible load....6.0 K. W.
The Michigan Stove Co.,
Detroit, Mich.

**Garland Electric Model 46-C.**

Four-unit cooking top with oven at right or left end and warming closet over oven. High shelf and canopy, side shelf and leg shelf. White enamel splasher walls and oven-door panel.
Cooking top .....24x26 in
Oven .....18x18x12 in.
Warming closet .....22x22x8 in.
Floor space .....28x56 in.
Height of cooking top.....31 in.
Four cooking-top units.....
each .....1200, 600, 300 watts
Oven units, top and bottom,
each .....1600, 800, 400 watts
Max. possible load....8.0 K. W.
Model 46 is similar but without closet and canopy.
The Michigan Stove Co.,
Detroit, Mich.

**Acorn Type E-15.**

Three-unit cooking top with oven below. High shelf. White enameled splasher, door panel and broiler pan. Cooker furnished in place of a hot plate, if desired. Side outlet for connecting portable appliances.
Oven .....18x14x18 in.
Three cooking-top units.....
each .....1000, 500, 250 watts
Oven units, top and bottom,
each .....1500, 750, 375 watts
Max. possible load....6.0 K. W.
Type E-25 is similar to E-15, but has four top units.
Rathbone Sard Electric Co.,
Albany, N. Y.

**Acorn Type E-45.**

Four-unit cooking top with oven at left or right end and broiling compartment over oven. High shelf and small side shelf. Enameled splashers and door panels. Cooker may be furnished instead of a hot plate. Side outlet.
Oven .....18x14x18 in.
Four cooking-top units.....
each .....1000, 500, 250 watts
Oven units, top and bottom,
each .....1500, 750, 375 watts
Broiling compartment unit...
.....1500, 750, 375 watts
Max. possible load....8.5 K. W.
Type E-35 is similar, but has warming closet over broiler and canopy over shelf.
Rathbone Sard Electric Co.,
Albany, N. Y.

**Acorn Type E-40.**

Four-unit cooking top with oven partly depressed at right or left side. Cooker may be furnished instead of a hot plate. Side outlet for connecting portable appliances. Sheathed-wire heating elements.
Oven .....18x14x18 in.
Four cooking-top units.....
each .....1000, 500, 250 watts
Oven units, top and bottom,
each .....1500, 750, 375 watts
Max. possible load....7.0 K. W.
Rathbone Sard Electric Co.,
Albany, N. Y.

**Acorn Type E-60.**

Six-unit cooking top with two ovens over each other at right or left end. White enameled splashers and oven-door panels. Cooker may be furnished instead of a hot plate. Side outlet.
Oven .....18x14x18 in.
Six cooking-top units.....
each .....1000, 500, 250 watts
Units for each oven, top and bottom ....1500, 750, 375 watts
Max. possible load...12.0 K. W.
Type E-65 is similar, but has warming closet over ovens and canopy over shelf.
Rathbone Sard Electric Co.,
Albany, N. Y.

**Acorn Type E-70.**

Two-unit cooking top with oven below. High shelf. White enameled splasher back, oven-door panel and broiler pan.
Oven .....18x12x12 in.
Two cooking-top units.....
each .....1000, 500, 250 watts
Oven units, top and bottom,
each .....1000, 500, 250 watts
Max. possible load....4.0 K. W.
Rathbone Sard Electric Co.,
Albany, N. Y.

### Rutenber Model 145.

Four-unit cooking top with oven at right end and warming closet over oven. High shelf and leg shelf. Thermometer in oven door. Plain or nickel finish.
Cooking top .....24x26 in.
Oven .....18x16x14 in.
Floor space .....24x50 in.
Total height .....56½ in.
Cooking-top units:
Three, each.1000, 500, 250 watts
One .....1500, 750, 375 watts
Oven units:
Top .....1500, 750, 375 watts
Bottom ....800, 400, 200 watts
Maximum possible load.....
.....6.8 K. W.
Model 130 is similar but has no warming closet.
Rutenber Electric Company, Marion, Ind.

### Rutenber Model 135.

Three-unit cooking top with oven at right end. High shelf and leg shelf. Plain or nickel finish.
Cooking top .....20x26 in.
Oven .....18x12x14 in.
Floor space .....22x50 in.
Total height .....48 in.
Cooking-top units:
Two, each.1000, 500, 250 watts
One .....1500, 750, 375 watts
Oven units:
Top .....1500, 750, 375 watts
Bottom ....800, 400, 200 watts
Maximum possible load.....
.....5.8 K. W.
Model 140 is similar, but has only two top units.
Rutenber Electric Company, Marion, Ind.

### Rutenber Model 105.

Four-unit cooking top with oven below. Low back. No shelves. Plain or nickel finish.
Cooking top .....24x26 in.
Oven .....18x14x16 in.
Floor space .....24x26 in.
Total height .....32 in.
Cooking-top units:
Three, each.1000, 500, 250 watts
One .....1500, 750, 375 watts
Oven units:
Top .....1500, 750, 375 watts
Bottom ....800, 400, 200 watts
Maximum possible load.....
.....6.8 K. W.
Model 110 is similar, but has only three top units.
Model 105 is similar, but has only two top units.
Rutenber Electric Company, Marion, Ind.

### Rutenber Model 126.

Three-unit cooking top with oven built in below. Made entirely of pressed steel with straight lines and plain finish.
Cooking top .....18x24 in.
Oven .....18x12x14 in.
Floor space .....18x24 in.
Total height .....32 in.
Three cooking-top units.....
each .....1000, 500, 250 watts
Oven units:
Top .....1500, 750, 375 watts
Bottom ....800, 400, 200 watts
Maximum possible load.....
.....5.3 K. W.
Model 121 is similar, but has only two top units.
Rutenber Electric Company, Marion, Ind.

### Simplex No. 5K.

Two-unit cooking top with oven below. Furnished with four cooking utensils and separate outside broiler. Can be supplied with B-O switch to prevent simultaneous use of oven and broiler units.
Cooking top .....16x28 in.
Oven .....15x12x11½ in.
Over-all size .....16x28 in.
Cooking-top units:
One (8-in.).735, 365, 180 watts
One (6-in.).440, 220, 110 watts
Broiler unit.1300, 650, 325 watts
Oven unit (half above and half below).....1300, 650, 325 watts
Max. possible load...3.77 K. W.
No. 4K is similar, but has three top units and no separate broiler unit.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 7K.

Three-unit cooking top with oven below. Furnished with four cooking utensils and separate outside broiler. Can be supplied with B-O switch.
Cooking top .....22x28 in.
Oven .....15x18x11½ in.
Over-all size .....22x28 in.
Cooking-top units:
Two, each..735, 365, 180 watts
One .....440, 220, 110 watts
Broiler unit..1300, 650, 325 watts
Oven unit (half above and half below).....1600, 800, 400 watts
Max. possible load...4.81 K. W.
No. 6K is similar but has one 735 and two 440-watt top units.
No. 8K is similar, but has four top units.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 9K.

Four-unit cooking top with oven below. Separate outside broiler and four cooking utensils.
Cooking top .....25x36 in.
Oven .....15x18x11½ in.
Over-all size .....25x36 in.
Cooking top units:
One .....1100, 550, 275 watts
Two each...735, 365, 180 watts
One .....440, 220, 110 watts
Broiler unit..1300, 650, 325 watts
Oven unit (half above and half below).....1600, 800, 400 watts
Maximum possible load.....
.....5.91 K. W.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 14K.

Four-unit cooking top with oven below. Separate outside broiler and six cooking utensils.
Cooking top .....25x36 in.
Oven .....21½x19x13 in.
Over-all size .....25x36 in.
Cooking-top units:
One (12-in.).1300, 650, 325 watts
One (10-in.).1100, 550, 275 watts
One (8-in.)...735, 365, 180 watts
One (6-in.)...440, 220, 110 watts
Broiler unit..2200, 1100, 550 watts
Oven unit (half above and half below) ....2400, 1200, 600 watts
Maximum possible load.....
.....8.175 K. W.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 22K.

Three-unit cooking top with plate warmer below and oven at side. Separate outside broiler and four cooking utensils. Can be supplied with B-O switch.
Oven .....15x18x11½ in.
Plate warmer .....15x15x7 in.
Over-all size .....24x28 in.
Over-all height .....35 in.
Cooking-top units:
Two, each..735, 365, 180 watts
One .....440, 220, 110 watts
Broiler unit..1300, 650, 325 watts
Warmer unit.200, 100, 50 watts
Oven unit...1600, 800, 400 watts
Max. possible load....5.0 K. W.
Nos. 21K and 23K are similar, but have different top units, No. 23K having 4 top units.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 24K.

Four-unit cooking top with plate warmer below and oven at side. Separate outside broiler and four cooking utensils.
Oven .....15x18x11½ in.
Plate warmer .....15x15x7 in.
Over-all size .....24x53 in.
Over-all height .....35 in.
Cooking-top units:
One .....1100, 550, 275 watts
Two, each..735, 365, 180 watts
One .....440, 220, 110 watts
Broiler unit..1300, 650, 325 watts
Warmer unit.200, 100, 50 watts
Oven units ..1600, 800, 400 watts
Maximum possible load.....
.....6.11 K. W.
No. 34K is similar, but has no plate-warmer closet.
Simplex Electric Heating Co., Cambridge, Mass.

### Simplex No. 32K.

Three-unit cooking top, with shelf below and oven at side. Separate outside broiler and four cooking utensils. Can be supplied with B-O switch.
Oven .....15x18x11½ in.
Over-all size .....24x48 in.
Over-all height .....35 in.
Cooking-top units:
Two, each..735, 365, 180 watts
One .....440, 220, 110 watts
Broiler unit..1300, 650, 325 watts
Oven unit...1600, 800, 400 watts
Maximum possible load.....
.....4.81 K. W.
No. 31K is similar, but has one 735 and two 440-watt top units.
No. 33K is similar, but has four top units.
Simplex Electric Heating Co., Cambridge, Mass.

### S-P Series A.

Two-unit cooking top with shelf below and two ovens above each other at right side. High shelf. Upper or bake oven has three square units adjustable in position.
Bake oven .....15x16x12 in.
Two cooking-top units.....
each .....900, 450, 225 watts
Three bake-oven units.....
each .....550, 275, 140 watts
Lower-oven unit .....
.....660, 330, 165 watts
Maximum possible load.....
.....4.1 K. W.
Series B range is similar, but has two auxiliary gas burners on cooking top.
S-P Stove Company, Wilmette, Ill.

**S-P Series C.**

Four-unit cooking top with two ovens above each other at right side. Bottom, side and high shelves. Bake oven has three square heating units adjustable in position.
Bake oven .....15x16x12 in.
Four cooking-top units, each .....900, 450, 225 watts
Three bake-oven units, each .....550, 275, 140 watts
Lower-oven unit .....660, 330, 165 watts
Maximum possible load..... 5.9 K. W.
S-P Stove Company,
Wilmette, Ill.

**Standard No. 350.**

Two-unit cooking top with short legs to sit on table. Oven pivoted at outside corner to swing over one hot plate of cooking top, this serving then as bottom oven unit. Kitchenette type.
Cooking top .....18x26 in.
Oven .....12½x9½x10 in.
Over-all size (with oven swung for use).....18x26 in.
Two cooking-top units, each .....1000, 500, 250 watts
Upper unit in oven.....1000, 500, 250 watts
Maximum possible load 3 K. W.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 550.**

Three-unit cooking top with oven built in below. Furnished with high shelf, if desired. Sectional glass-panel oven door.
Cooking top .....20½x29 in.
Oven .....11x12x19 in.
Over-all size .....20½x29 in.
Height (without shelf)...33 in.
Three cooking-top units, each .....1000, 500, 250 watts
Oven units, top and bottom, each.....1000, 500, 250 watts
Maximum possible load 5 K. W.
No. 450 is similar but has a smaller oven and only two top units.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 455.**

Two-unit cooking top with oven below and heat-storage cooker compartment at left side. Clock regulator and utensils for cooker. Glass-paneled oven door.
Oven .....11x12x16 in.
Over-all size .....18x33½ in.
Height .....33 in.
Two cooking-top units, each .....1000, 500, 250 watts
Cooker unit .....660 watts
Oven units, top and bottom, each.....1000, 500, 250 watts
Maximum possible load..... 4.66 K. W.
No. 555 is similar but has a larger oven and three top units.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 501.**

Two-unit cooking top with heat-storage cooker compartment between the units and cabinet oven elevated on high shelf. Clock regulator for compartment, oven or hot plates. Glass-paneled oven door. Side shelves.
Oven .....11x12x19 in.
Over-all size .....24x46 in.
Over-all height .....61 in.
Cooking-top units, one..... .....1500, 750, 375 watts
One .....1000, 500, 250 watts
Cooker unit .....660 watts
Oven units, top and bottom, each .....1000, 500, 250 watts
Maximum possible load..... 5.16 K. W.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 601.**

Two-unit cooking top with two heat-storage cooker compartments between the units and cabinet oven on high shelf. Clock regulator. Cooker utensils. Glass panels in oven door.
Oven .....11x12x19 in.
Over-all size .....24x57 in.
Over-all height .....61 in.
Two cooking-top units, each .....1000, 500, 250 watts
Two cooker units, each..... .....660 watts
Oven units, top and bottom, each .....1000, 500, 250 watts
Maximum possible load..... 5.32 K. W.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 619.**

Three-unit cooking top with heat-storage cooker compartment between two of the units and cabinet oven on high shelf. Canopy over high shelf. Side shelves. Clock regulator. Cooker utensils. Glass-paneled oven door.
Oven .....11x12x19 in.
Over-all size .....24x57 in.
Over-all height .....61 in.
Three cooking-top units, each .....1000, 500, 250 watts
Cooker unit.....660 watts
Oven units, top and bottom, each .....1000, 500, 250 watts
Maximum possible load..... 5.66 K. W.
Standard Electric Stove Co.,
Toledo, Ohio.

**Standard No. 621.**

Three-unit cooking top with heat-storage cooker compartment between two of the units and cabinet oven and separate broiler closet on high shelf. Side shelves. Clock regulator. Cooker utensils. Glass panels in oven door.
Oven .....11x12x19 in.
Broiler .....6x13x13 in.
Over-all size .....24x57 in.
Over-all height .....61 in.
Three cooking-top units, each .....1000, 500, 250 watts
Cooker unit .....660 watts
Broiler unit..1000, 500, 250 watts
Oven units, top and bottom, each .....1000, 500, 250 watts
Maximum possible load..... 6.66 K. W.
Standard Electric Stove Co.,
Toledo, Ohio.

**Westinghouse Type 3-19.**

Three-unit cooking top with two superposed ovens at left or right end. High shelf and leg shelf. With or without automatic time and temperature control for ovens.
Large oven ....18½x13½x16 in.
Small oven....10⅜x13½x11½ in.
Over-all size .....25x43 in.
Over-all height .....59 in.
Cooking-top units—
One .....2000, 1000, 500 watts
Two, each 1000, 500, 250 watts
Large-oven units, top and bottom, each 1000, 500, 250 watts
Small-oven unit..... .....850, 425, 215 watts
Max. possible load...6.85 K. W.
Also made with electric ovens and gas top burners.
Westinghouse Elec. & Mfg. Co.,
East Pittsburgh, Pa.

**Westinghouse Type 3-19 Double.**

Six-unit cooking top with two superposed ovens at each end. Range consists of a right and left Type 3-19 assembled side by side as a double unit. Automatic or nonautomatic. Ovens, units, etc., same size as Type 3-19 but twice in number.
Over-all size .....28x84 in.
Over-all height .....61 in.
Maximum possible load..... .....13.7 K. W.
Also made as combination range with all ovens electric and entire cooking top equipped with gas burners.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**Westinghouse Type 2-19.**

Three-unit cooking top with oven below. Automatic or nonautomatic. Provided with high shelf and splasher back, if desired.
Oven .....18½x13½x16 in.
Over-all size.....24¼x32 in.
Over-all height (without shelf) .....34 in.
Cooking-top units—
One .....2000, 1000, 500 watts
Two, each 1000, 500, 250 watts
Oven units, top and bottom, each .....1000, 500, 250 watts
Maximum possible load 6.0 K. W.
Also made as combination range with gas top burners and electric ovens.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

**Westinghouse Type 406.**

Two-unit cooking top with oven below. Nonautomatic control. Plain finish. Can be supplied with high shelf and splasher back, if desired.
Oven .....16x12x11½ in.
Over-all size .....16½x31½ in.
Over-all height (without shelf) .....31½ in.
Two cooking-top units, each .....1000, 500, 250 watts
Oven units—
Top .....660, 330, 165 watts
Bottom ...1000, 500, 350 watts
Maximum possible load..... .....3.66 K. W.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

# Activities in the Trade

**Hughes Electric Heating Company,** 5660 West Taylor Street, Chicago, Ill., is sending out a mailing folder to the trade in connection with the national campaign the company is conducting on the Hughes electric range. Forms of dealer helps and co-operation are illustrated.

**A. Hall Berry,** representative and selling agent for a number of electrical manufacturers, announces the removal of his offices on April 28 to larger quarters at 71-73 Murray Street, New York City. Increasing business and the handling of several new lines necessitated additional office space.

**National X-Ray Reflector Company,** 53 West Jackson Boulevard, Chicago, Ill., has issued bulletins on its flood-lighting units for protecting industrial plants and for illuminating the United States flag, on its "Mogul" projector No. 90, and prints of an article on the Ferree test for eye efficiency.

**Verne W. Shear & Company,** sales engineers, Akron, O., representing the Condit Electrical Manufacturing Company, the Pittsburgh Transformer Company and the Electrical Engineers Equipment Company in Northern Ohio, have established a branch office in the Illuminating Building, Cleveland, O., in charge of Bon J. Ballard.

**American Electrical Works,** Phillipsdale, R. I., manufacturer of bare and insulated wire and cables, galvanized iron wire and strands, and power and telephone cables, has issued a new price list, effective April 25, of its products. The concern has also issued a revised list of charges for reels and spools upon which its products are shipped.

**Gold Car Heating & Lighting Company,** 17 Battery Place, New York City, has issued a folder descriptive of its thermostatic heat-regulating system. This system consists of an electric thermostat, which operates contacts by the expansion and contraction of a temperature-sensitive diaphragm, and a special electromagnetic valve which takes the place of the ordinary inlet valve on a radiator.

**Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., has adopted roller skates as a means of transportation for its office boys in its works in East Pittsburgh, and it has proven a profitable business proposition, the time of trips being materially lessened. Contrary to what might be expected, the boys do not consider the innovation a lark, but purely a business proposition.

**Cumberland Electric Manufacturing Company,** manufacturer of low-voltage transformers and electrical specialties, has moved its factory and office from Clarksville, Tenn., to Memphis, Tenn., where a modern factory has been secured. The company made the change because of the necessity for larger quarters to take care of its increasing business and to secure better shipping facilities and working conditions.

**The A. B. Wilson Company,** 452-453 Leader-News Building, Cleveland, O., which was organized in 1914 as a manufacturers' agency for electrical specialties, has outgrown its original quarters and moved to more spacious offices in the Leader-News Building. The company reports considerable success in its field, the business having developed from local representation to sole sales agency, as well as manufacturing of its three main products—Burr Efficiency Units, "Perfection 66" switch boxes and Snover loom fasteners. The A. B. Wilson Company is represented by Doherty-Hafner Company, Chicago, Ill.; Arthur Organ, New York City; Brown & Hall Supply Company, St. Louis, Mo.; S. M. Hofheimer, Philadelphia, Pa., and M. V. Simpson, Los Angeles, Cal., and operates through special representatives in the central territory east of the Mississippi River.

**"Old Glory" at the General Electric Plant.**—The wave of patriotism now at its crest in this country found expression at Lynn, Mass., on April 25, when at the close of the working day 37 American flags were unfurled with appropriate ceremonies. For some weeks the employees had been collecting funds in the different buildings to buy flags, each building vying with the other to secure the finest flag possible. The officials of the company backed up the project in a thoroughly substantial way and as a result the chief buildings were all provided for, 13 flags and poles were secured for the Federal Street Works, and 24 for the River Works in West Lynn. It is estimated that at least 11,000 employees joined in the dedicatory exercises, the national anthem being first sung, followed by the national salute of 21 guns. With music and addresses, the impressive and enthusiastic exercises were concluded. Manager Walter C. Fish and John F. Fitzgerald, ex-mayor of Boston, made brief addresses at the River Works, while at Federal Street Daniel G. Gauchet, production manager, and Charles F. Weed, of the Boston Chamber of Commerce, held the attention of the audience.

**Snyder Electric Furnace Company,** Chicago, reports recent sales of Snyder furnaces as follows: The West Steel Casting Company, Cleveland, O., will install a three-ton furnace; Pratt & Cady Manufacturing Company, Hartford, Conn., two-ton, two-phase furnace; Joyce-Cridland Company, Dayton, O., two-ton, two-phase furnace; Beaumont Iron Works, Beaumont, Tex., one-ton, single-phase furnace; W. K. Henderson Iron Works & Supply Company, Shreveport, La., ¾-ton, single-phase furnace; The United Alloys Steel Corporation, Canton, O., 1½-ton, single-phase furnace for the melting of 80-per-cent ferro-maganese so as to add the manganese molten to the open-hearth metal. By the employment of special slags it is believed that the manganese loss as compared with adding the ferro-manganese cold will be reduced and a considerable saving effected. Among other Snyder electric furnaces recently started up was one in the plant of the Frog Switch & Manufacturing Company, Carlisle, Pa., for the melting of manganese-steel scrap, which contains approximately 12.25 to 12.50 per cent manganese. The metal when poured from the electric furnace after the addition of from 15 to 20 pounds of 80 per cent ferro-manganese per ton shows a manganese content of from 12.25 to 12.50 per cent. Special slags are employed to reduce the loss of manganese.

**Enlistment of Cutler-Hammer Employees Not to Interfere with Commercial Production.**—Reports have reached the Cutler-Hammer Manufacturing Company that an understanding exists that its Milwaukee factory has been taken over by the Navy Department and that in consequence production of the usual commercial goods will be obstructed. The following explanation by the company shows that better production of these goods has been insured. When, at the request of the President, the five national engineering societies undertook to obtain an inventory of the resources of the country under the auspices of the Naval Consulting Board, there was included in the inventory blank an inquiry as to whether or not the corporation reporting was in favor of an Industrial Reserve, which would keep skilled men at the benches in war time and would prevent their enlisting, or being drafted, for other service. The object obviously was to insure that the services of the men would be applied in the manner most advantageous to the country as a whole. A. W. Berresford, general manager of the Cutler-Hammer

company, and a member of the Naval Consulting Board, reports that about 70 per cent of the corporations reporting were in favor of this proposition and the nearest approach to it incorporated in any legislation was included in the Navy Bill and was termed the "Naval Coast Defense Reserve." The provisions to this act made it possible for the Navy Department to enlist in various ranks skilled workers throughout the country. Under the terms of this enlistment the man was definitely sworn in as a member of the Reserve. He was paid $1 per month during peace times, but under such conditions his liberty of movement was not interfered with, except that he was required to report whenever he changed his position. In war time, however, he became an enlisted man; could not resign, nor could he enlist in any other service, and, if occasion required, it became immediately possible for the Navy Department to take charge of any such body of men and operate them in the shop and on government work for which orders were in hand. It was understood that action of this nature would not be taken unless the shop in question either did not give preference to government work or was not making as much speed in production as the Navy Department felt was possible. The condition in the Milwaukee plant at the present time is that out of some 2,000 people approximately 400 shop men are enlisted in the Naval Coast Defense Reserve, and some 40 in the testing room, engineering department and office force. There has been absolutely no interference with the progress of work in the shop by the Navy officials, nor is any anticipated, since this number of men would be ample to meet even emergency requirements of the Navy. It may be seen, therefore, that far from interfering with the manufacture and shipment of the regular line of C-H motor control apparatus and other products, the enlistment would tend toward the maintenance of normal shop conditions.

# Latest Approved Fittings

**The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, after examination and tests conducted under standards of the National Electric Code as recommended by the National Fire Protection Association**

**BUSHINGS.—Multi Electrical Manufacturing Company,** 703 Fulton Street, Chicago, Ill.

Porcelain bushings with copper-plated steel wire clamps, "Multi," catalog Nos. 10, 15, 20, 30, 40, 50, 60.

Listed March 30, 1917.

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**FIXTURES.—Boyd & Johnson,** 1493 Broadway, New York, N. Y.

Transparency for use on theater stages, consisting of a number of metal inclosures mounted one above the other and each having an incandescent lamp which illuminates a painted muslin sign which forms the front of the compartment.

Listed April 3, 1917.

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**FUSES, Plug.—Bussmann Manufacturing Company,** 3819 North 23d Street, St. Louis, Mo.

Edison plug fuses with brass-rimmed mica cap and having fiber for insulation of live parts. "Buss," 0-30 amperes, 125 volts.

Listed April 13, 1917.

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**HEATING APPLIANCES, Cooking and Liquid.—Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa.

Toaster stoves, 500 watts, 100-125 volts, styles 214903, 236539.

Listed April 5, 1917.

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**HEATING APPLIANCES, Industrial and Laboratory.—Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa.

Solder pots, 8 and 15-lb. sizes, 100-250 volts, style No. 13631-A.

Listed April 4, 1917.

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**INSULATING SUPPORTS.—National Metal Molding Company,** Fulton Building, Pittsburgh, Pa.

Stamped steel bases, sherardized, to which porcelain insulators are bolted. "National." Catalog Nos. 5001-03.

For low-potential conductors No. 8 B. & S. gauge or smaller, where not exposed to the weather.

Listed April 13, 1917.

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**OUTLET BUSHINGS.—Utility Fittings Company,** 812 Walnut Street, Philadelphia, Pa.

Cast-iron fitting with two conduit entrances at right angles, and having opening for drawing in wires with threaded closure cap. "Utility," type, Y, ½-inch size.

Listed February 27, 1917.

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**PLUGS, Stage Type.—Sprague Electric Works of General Electric Company,** 527 West 34th Street, New York, N. Y.

Interchangeable fiber plug for use in single and double type receptacles provided with cast-iron boxes, Type "S," 50 amperes, 125 volts, catalog Nos. 158146, 158147.

Listed April 17, 1917.

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**RECEPTACLES, Medium Base.—Crouse-Hinds Company,** Syracuse, N. Y.

"C. H. Co." porcelain shell, keyless, catalog Nos. PE56, PE67, PE67G.

Listed March 28, 1917.

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**RECEPTACLES, Medium Base.—E. H. Freeman Electric Company,** Trenton, N. J.

Porcelain shell, keyless, "Russell," catalog No. 280.

Listed April 13, 1917.

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**RECEPTACLES (For Attachment Plugs) AND PLUGS.—Harvey Hubbell, Incorporated,** Bridgeport, Conn.

"Hubbell," 10 amperes, 250 volts, catalog No. 6103.

Listed April 17, 1917.

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**RESISTANCE APPLIANCES.—General Electric Company,** Schenectady, N. Y.

Drum controllers (without primary oil-switch attachment), Type CR-3922.

Speed controllers, Type CR-1303.

Listed April 13, 1917.

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**SOCKETS, Medium Base.—Trenton Electric & Conduit Company,** Trenton, N. J.

"T. E. & C. Co." porcelain shell, keyless, catalog No. 155.

Listed April 17, 1917.

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**SWITCH BOXES.—Acme Metal Stamping Company,** Cleveland, O.

Pressed-steel switch-box having removable side and suitable fastening for assembly in gangs, furnished with or without flexible tubing clamps. "AMSCO." Catalog No. 90.

Listed March 2, 1917.

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**SWITCHES, Inclosed.—The Trumbull Electric Manufacturing Company,** Plainville, Conn.

Two-pole and three-pole knife switches and cutout bases for standard plug fuses. Inclosed in metal cases and designed for manual operation without opening cases.

"Circle T," 30 amperes, 125 volts, catalog Nos. 5642-43, 5646-47.

Listed March 21, 1917.

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**SWITCHES, Knife.—Trenton Electric & Conduit Company,** Trenton, N. J.

"T. E. & C. Co." 30 amperes, 125 volts, catalog Nos. 1400, 1404; 30 amperes, 250 volts, catalog No. 1402.

Listed March 28, 1917.

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**SWITCHES, Pendant.—General Electric Company,** Schenectady, N. Y.

"G. E." single-pole, push, catalog No. GE683.

Listed April 17, 1917.

# Personal and Biographical

C. H. ROBERTS, formerly factory accountant of the Hess-Bright Manufacturing Company, Philadelphia, Pa., has been appointed comptroller of the company.

MR. W. J. O'BRIEN, of Philadelphia, Pa., has been appointed manager of the Corpus Christi (Tex.) Railway & Light Company, which is owned by the firm of Newburger, Henderson & Loeb, of Philadelphia.

CHARLES Y. McVEY, general manager of the Ohio State Telephone Company in Cleveland, O., has been elected a director and president of that company at a meeting of the board of directors in Columbus last week. He succeeds SAMUEL G. McMEEN.

L. W. McLELLEN, who has been connected with the United Gas & Electric Company for the past ten years, has resigned as the commercial manager of the company's offices in Jeffersonville and New Albany, Ind., to become commercial manager of the Quincy (Ill.) Gas, Electric & Heating Company, succeeding A. E. ENGLISH, who has accepted a position in Springfield, Ill.

BYRON C. FOWLES, who is well known in the electrical field in the South through his connection with the Arkansas Association of Arkansas Public Utility Operators and as secretary-treasurer and general superintendent of the Pine Bluff (Ark.) Company, has resigned to become general manager of the public-utility properties in Kingsport, Tenn., which include electric light and power, water, gas and sewerage systems. Mr. Fowles has been manager of the Pine Bluff plant since 1904, and previous to that time was connected with the Richmond (Ind.) Light, Heat & Power Company and the Bay City (Mich.) Gas & Electric Company. He is a graduate of Drexel Institute, of Philadelphia. Mr. Fowles has been very closely associated with the affairs of the Arkansas Association of Public Utility Operators, of which he is now secretary.

G. F. STURGEON, who has directed the work of the engineering department of the Central Electric Company, of Chicago, Ill., for a number of years, has resigned to take active supervision of his ranch near Twin Falls, Idaho. Previous to his connection with the Central Electric Company, Mr. Sturgeon had supplemented his technical education with five years of shop practice and several years service in the United States navy. When the Spanish-American War broke out Mr. Sturgeon resigned his position and was assigned as assistant engineer on the U. S. S. *Saturn* of the Atlantic Fleet. Just at the present time he considers it his patriotic duty to devote his personal attention to his ranch, part of the output of which is ten carloads of potatoes yearly. He later will go into the electrical business in Twin Falls, which, because of the immense water power in the vicinity, is a valuable field for the electrical industry.

NIKOLA TESLA, who was awarded the seventh Edison medal on December 13, 1916, "for meritorious achievements in his early original work in polyphase and high-frequency electric currents," will receive the medal at a presentation to be made at the annual meeting of the American Institute of Electrical Engineers in the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, on May 18 at 8:30 p. m. President H. W. Buck will preside, and addresses will be made by Dr. A. E. Kennelly, chairman of the Edison Medal Committee; Charles A. Terry, of New York, and B. A. Behrend, of Boston. The Edison Medal was established upon the initiative of a group of friends

Nickola Tesla.

and associates of Thomas A. Edison, for the purpose of recounting and celebrating the achievements of a quarter of a century in the art of electric lighting, with which the name of Edison is imperishably identified. It was decided that the most effective means of accomplishing this object would be by the establishment of a gold medal, which should, during the centuries to come, serve as an honorable incentive to scientists, engineers and artisans to maintain by their works a high standard of accomplishment. The Edison Medal was, therefore, established and endowed with a trust fund, under an indenture dated February 11, 1904, whereby the American Institute of Electrical Engineers agreed to award the medal annually. It is awarded each year by a committee consisting of 24 members of the Institute to a resident of the United States of America and its dependencies, or of the Dominion of Canada, "for meritorious achievement in electrical science or electrical engineering or the electrical arts."

C. H. HOLDEN, formerly sales manager of the P. R. Manufacturing Company, Detroit, Mich., has been appointed central district manager for Edwards & Company, manufacturers of electric bells and other specialties, New York City, and has established a sales office at 9 South Clinton Street, Chicago.

JOHN G. BARRY, who has been associated with the General Electric Company at Schenectady, N. Y., for 20 years, has been appointed general sales manager of the company. He will continue his present duties as manager of the company's railway department. Mr. Barry has a host of friends in the electrical field, who will be glad to learn of his advancement and increased responsibilities.

WILLIAM D. RAY, vice-president and general manager of the Pennsylvania Utilities Company, Easton, Pa., has resigned as general manager but retained his interest as vice-president of the company, which recently was taken over by the General Gas & Electric Company, New York City. Mr. Ray is one of the most widely known men in the central-station field, having been associated with the electrical industry for over 30 years. He was born in Normal, Ill., and received his education in the schools of Oak Park, Ill. He started his electrical career with the Chicago & Northwestern Railroad, and later was assistant electrical engineer of the Standard Electric Company, Chicago. During the World's Fair at Chicago Mr. Ray was assistant superintendent of operation of the electrical department. In 1894 he became superintendent and later general manager of the electric-railway properties in Everett, Wash., returning to Chicago in 1897 to become sales enquirer for the Lorain Steel Company, handling motor equipment for street railways. He left this company to become electrical engineer for the Detroit Construction Company and supervised the building of several electric traction lines in Michigan. From 1905 to 1909 Mr. Ray was contract agent in the electrical department of the City of Chicago, following which he became manager of the gas and electric properties in Hammond, East Chicago, Indiana Harbor and Whiting, Ind., and later was made vice-president and manager of Northern Indiana Gas & Electric Company, continuing in this capacity in 1915 when he became associated with the Pennsylvania Utilities Company. Last week Mr. Ray was the guest at a reception and banquet given by his business and social friends in Easton, who presented him with a watch as a testimonial of the high esteem in which he is held in Easton. Mr. Ray has not yet announced his plans for the future.

## OBITUARY.

MARK LOWD, southwestern manager of the Stone & Webster Engineering Corporation, Dallas, Tex., died April 27 at his home in that city, of pneumonia, after a short illness. Mr. Lowd was one of the most respected members of the Southwestern Electrical and Gas Association. The Association, which was in convention at Dallas, passed resolutions, which were sent to the family, together with a floral tribute. Mr. Lowd was 47 years old and is survived by his wife and two daughters.

# Current Electrical News

## WEEKLY RECORD OF CONSTRUCTION ACTIVITIES

### EASTERN STATES.

OQUOSSOC, ME.—The Public Utilities Commission has authorized the Oquossoc Light & Power Company to issue $10,000 in capital stock, part of the proceeds to provide for plant extension.

NEWMARKET, N. H.—The Newmarket Electric Company has asked permission from the Public Service Commission for the purchase of the property of the Newmarket Light, Heat & Power Company.

CHITTENDEN, VT. — The Pittsford Power Company will install a new 1200-horsepower turbogenerator in its local power house and will erect a 13,000-volt transmission line to the substation in Castleton.

MONTPELIER, VT. — The Hortonia Light & Power Company has applied to the Public Service Commission for authority to increase its capital stock from $150,000 to $500,000. It is proposed to make expenditures on projects in Salisbury and on Otter Creek near Vergennes.

RUTLAND, VT.—The Hortonia Light & Power Company, with headquarters here, and supplying electricity in northwestern Vermont, with 14 plants, mostly hydroelectric, has purchased additional water rights on the New Haven River in Bristol and will make a 1000-kilowatt development. Plans call for the extension of a penstock now supplying a 250-kilowatt station 1000 feet, giving a head of 250 feet, and to install a new waterwheel and generator. Lines will be extended to Monkton and Hinesbury.

FALL RIVER, MASS.—The Massachusetts Waterways Commission has decided not to permit the Fall River Electric Light Company to stretch wires across Taunton River, but the company may apply for another location, under the power of eminent domain contained in a new law which goes into effect about May 1. The new act provides that an electric light company may take land on order of the Gas and Electric Light Commission to complete a right of way after it has acquired at least half of the length of line.

FRANKLIN, MASS.—The Union Light & Power Company will probably construct at once a high-tension line between North Attleboro and Mansfield, with a loop from Woonsocket, R. I., to Franklin, Foxboro, Mansfield and North Attleboro, and thence to Woonsocket.

SPRINGFIELD, MASS.—The Turners Falls Power Company is negotiating for a tract of land in the Chicopee Meadows and it is understood that a power plant will be located in that locality.

WEYMOUTH, MASS.—The Weymouth Light & Power Company has petitioned the Public Service Commission for authority to issue 1,900 shares of stock at $160, to pay for plant improvements.

GLASTENBURY, CONN.—The Central Connecticut Power & Light Company is planning additional equipment on its 13,200-volt line in the Glastenbury division.

NEW HAVEN, CONN.—The United Illuminating Company will extend its distribution system to the town of Trumbull, where it will furnish electric service.

BROOKLYN, N. Y.—Alderman Hilkemeir is advocating the installation of additional street-lighting units in Central and Irving Avenues.

NEWARK, N. Y.—The Board of Managers, New York State Custodial Asylum for Feeble-Minded Women, will receive bids until May 18 for the installation of new boilers, stokers, piping, etc., and heating work. Lewis F. Pilcher, State Architect, Albany; New York office, Woolworth Building.

NEW YORK, N. Y.—The New York Telephone Company has acquired property at Grand View Place and 167th Street for a consideration of $50,000 as a site for a large central station.

BAYONNE, N. J.—The Board of City Commissioners has adopted resolutions ordering the Public Service Electric Company to make extensions in its underground conduit system to cost $10,000, in accordance with agreement with the city. The work includes the extension of the white-way street-lighting system to the Bergen Point district.

BRIDGETOWN, N. J.—The Electric Company of New Jersey has recently closed a contract with the Cumberland Glass Company to furnish power and light for its factory. The cost of the service installation will be about $40,000.

JERSEY CITY, N. J.—The Board of Education has authorized the installation of electric lighting systems in Public Schools Nos. 1, 9, 11 and 20. Bids will soon be asked. S. F. Ege is secretary.

NEWARK, N. J.—The Board of Freeholders is planning extensions and improvements in the electric light and power plant at the county penitentiary.

NEWARK, N. J.—The Board of Fire Commissioners is considering extensions and improvements in the city fire-alarm telegraph system. Adam Bosch is superintendent of the telegraph department.

WHARTON, N. J.—The Wharton Steel Company is considering the electric operation of its iron mines at Hibernia, transmitting power from the plant at Wharton to the properties.

DUBOIS, PA.—Plans are being completed for the installation of a proposed ornamental lighting system on Long Avenue and Brady Street. J. R. Cravath, of Chicago, is the engineer.

EASTON, PA.—The Pennsylvania Utilities Company is building new power lines to Shawnee and Stroudsburg. The latter line, carrying 33,000 volts, will furnish service to the Analomink Paper Mills, which is now installing new motor equipment for electric operation of the plant.

JOHNSTOWN, PA.—Plans for the establishment of a white way in Johnstown will be submitted to the Citizens Light, Heat & Power Company and it is expected that the company will begin the work in the near future.

KUTZTOWN, PA.—The City Council is making plans for the construction of an electric light and power plant, to cost about $23,000.

NAZARETH, PA.—The Pennsylvania Cement Company is installing new motor equipment to total about 2,000 kilowatts, making an aggregate of over 3,000 kilowatts now used for plant operations. The company is furnished with power by the Pennsylvania Utilities Company, over a 33,000-volt line from Easton.

PHILADELPHIA, PA.—The United Gas Improvement Company is planning improvements and betterments in its local plants to cost about $1,260,000. Samuel T. Bodine is president.

PHILADELPHIA, PA.—The Philadelphia Electric Company has filed plans for extensions and improvements at its power station on Christian Street, including new cable railway line, to cost about $45,000.

READING, PA.—The Reading Transit & Light Company has been granted permission by the Public Service Commission to acquire the properties of a number of electric light and railway companies in Lebanon and Berks Counties.

READING, PA.—The Reading Transit & Light Company and the Metropolitan Electric Company are planning to use the underground conduits in the business section of the city installed a few years ago. The wiring installations and connections necessary for the operation of the proposed system are estimated to cost $1,000,000. E. L. West is president of the companies.

TOPTON, PA.—S. R. Rothermel, of Reading; V. S. Martin, of Topton, and W. J. Martin, of Reading, builders of a number of rural electric lines in Pennsylvania, have applied for charters for three new electric companies for Topton, Mertztown and Bowers.

BALTIMORE, MD.—The Board of Estimates is arranging with the Pennsylvania Railroad for electrifying its local freight terminals, in connection with other line and terminal improvements.

WASHINGTON, D. C.—The Chesapeake & Potomac Telephone Company has filed plans for improvements and extensions in its station on Twelfth Street, N. W., to cost about $35,000.

NORTON, VA.—The Appalachian Power Company, of Bloomfield, W. Va., will construct an electric transmission system between Norton, Easserville, Wise and other towns in this section.

BLUEFIELD, W. VA.—In connection with the proposed plans of the local Chamber of Commerce for the construction of a railway line about 50 miles long between Bluefield, Welch and neighboring sections, it is reported that the Appalachian Power Company will furnish power for the operation of the line. The work is estimated to cost over $1,500,000.

MOREHEAD, N. C.—The city will install an electric light plant. C. Smith is superintendent.

CONWAY, S. C.—The Quattlebaum Light & Ice Company will install additional engine and generator equipment. Paul Quattlebaum is manager of the company.

MIAMI, FLA.—Improvements to cost about $75,000 will be made in the electric light plant of the Miami Light Company, of which H. H. Hyman is manager. A steam engine and generator will be installed.

### NORTH CENTRAL STATES.

BARBERTON, O.—The Light Department of the City Council is planning the installation of new boiler and generating equipment in the municipal electric lighting plant. The estimate for the boiler equipment is placed at $61,000, and the generating equipment, including buildings, will cost about $48,000.

SALEM, O.—The Salem Electric Light & Power Company is taking preliminary steps for improvements and additions to its plant. It is proposed to install new boiler equipment. W. B. Carey, Salem, O., is manager of the company.

WATERVILLE, O.—Citizens here have voted for the installation of an electric distribution system to provide street lighting, commercial and domestic service. The improvements will cost about $10,000.

BICKNELL, MD.—Work has commenced on the construction of one of the largest power and water plants in the state, at Edwardsport, near this city. The plant is being built by the Indiana Power & Water Company, a $2,000,000 corporation that was formed last winter by Chicago and Bloomfield capitalists.

FREEPORT, ILL.—It is reported that over $100,000 will be spent in this city by the Illinois Central Railroad Company during the coming summer. About $20,000 worth of electrical machinery will be installed in the shops and an equal amount will be spent in electrification of the coal chute at the shops. H. G. Bridenbaugh, of Springfield, has charge of the plans.

SCALESMOUND, ILL.—The C. L. Walton Lighting Company has been incorporated with a capital of $2,500 to provide electric service here.

MULLIKEN, MICH. — The Mulliken Electric Lighting Company has been incorporated with a capital of $3,000 to furnish electric service here.

TRAVERSE CITY, MICH.—A system of boulevard lighting is to be installed here in the near future, according to a decision of the City Commission.

ASHLAND, WIS.—Articles of incorporation of the Big Fall Power Company have been filed in this city. The company is capitalized at $25,000 and the incorporators are John B. Sanborn, C. E. Blake and William Aberg, of Madison. The company proposes to deal in flowage lands for the purpose of creating electric power.

CHILTON, WIS.—The Wisconsin Public Service Company, it is announced, has purchased the holdings of the Chilton Electric Light & Power Company and is making plans for rebuilding the local plant. The company will extend its power lines from Green Bay into Chilton. The local plant has been in litigation for a number of years. M. H. Snell will remain as local manager of the plant.

SAUK PRAIRIE, WIS.—The organization of the Sauk Prairie Light & Power Company, which was announced in the issue of April 21, has been completed. The company is capitalized at $10,000 and proposes to erect a transmission line to connect with the lines of the Wisconsin Power & Light Company to furnish electric service in Sauk Prairie and vicinity. L. E. Stone is president of the new company and John Meisser is manager.

WAUPUN, WIS.—The installation of a white-way system in Main Street will be made. Vaughn & Meyer, of Milwaukee, are the engineers.

CLINTON, IOWA.—The Clinton Gas & Electric Company has filed a new mortgage, which gives the company the privilege of issuing bonds up to $1,500,000 for the purpose of financing improvements and extensions. A. L. Schuyler is secretary of the company.

CONROY, IOWA.—The Iowa Electric Company of Marengo, Iowa, is erecting a transmission line to this place and will furnish electric service here.

AURORA, MO.—The city will vote on $25,000 bonds for the installation of an electric light plant.

BOONVILLE, MO.—The Kemper Military School is having plans prepared for improvements to power house, including additional boilers and generators.

ST. LOUIS, MO.—A permit has been issued to the Union Electric Light & Power Company for the construction of a three-story power plant at 908 St. Charles Street, to cost about $75,000.

COUNCIL GROVE, KANS.—The Morris County Light & Power Company was recently chartered with $25,000 capital stock by Albert Emanuel and H. T. Lause, of Dayton, O., and J. T. Skinner, of Lawrence, Kans., to build and operate an electric plant in this locality.

DOUGLASS, KANS.—Bonds in the sum of $5,000 may be issued to provide for the establishment of an electric lighting system here.

ELLIS, KANS.—Improvements costing $10,000 will be made to the local electric light and power plant. Plans are being made by Black & Veatch, 507 Interstate Building, Kansas City, Mo.

KENSINGTON, KANS.—Improvements are contemplated for the municipal electric lighting plant.

MANHATTAN, KANS.—The Manhattan Ice, Light & Power Company and the Manhattan Gas Company have consolidated into the Manhattan Gas & Electric Company, with slight changes in stock ownership. The latter company is a $500,000 corporation with an authorized issue of $220,000 preferred stock and $300,000 common stock.

STOCKTON, KANS.—Plans are being considered here for the installation of an electric lighting plant.

TOPEKA, KANS. — The Tri-County Light & Power Company and the Western Sumner Light & Power Company have made application for permission to operate in and near the towns of Norwich, Milton, Viola, Mayfield and Arkoniz.

BLOOMFIELD, NEB.—The local electric light plant, owned by Louis Knudson, has been sold to the Nebraska Electric Company and Mr. Knudson has joined the company's organization.

GREELEY, NEB.—P. A. Johansen, of Anita, Iowa, is planning to establish an electric light and power plant in Greeley, to cost $15,000.

KEARNEY, NEB.—The holdings of the Kearney Water & Electric Power Company have been sold to the L. E. Myers Company, of Chicago, Ill. The deal involved about $250,000. C. E. Collins, vice-president of the Myers company, has stated that a large amount of money will be spent on additions to the local plant, including widening of the Kearney canal and installation of more generating equipment.

PLANKINTON, S. D.—Bonds in the sum of $16,000 have been voted for purchasing the local electric plant.

YANKTON, S. D.—The holdings of the Yankton Heat, Light & Power Company, together with those of the Watertown (S. D.) Light & Power Company, both of which companies were owned by the Ferris Brothers System, have been sold to the Union Company of Omaha, which controls a number of electric utilities in towns in Nebraska, South Dakota and Iowa.

JUD, N. D.—Business men here are contemplating the installation of an electric light and power plant.

## DATES AHEAD.

National Fire Protection Association. Annual meeting, Washington, D. C., May 8-10. Secretary-treasurer, Franklin H. Wentworth, 87 Milk Street, Boston, Mass.

Arkansas Association of Public Utility Operators. Annual convention, Pine Bluff, May 16-18. Secretary-treasurer, R. B. Fowles, Pine Bluff Company, Pine Bluff, Ark.

Missouri Association of Public Utilities. Annual meeting, aboard Steamer Quincy enroute from St. Louis, May 17-19. Secretary, F. D. Beardslee, 315 North Twelfth Street, St. Louis, Mo.

Electrical Supply Jobbers' Associations. Semi-annual meeting, Homestead Hotel, Hot Springs, Va., May 23-24. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

Iowa Section, National Electric Light Association. Annual convention, Des Moines, Iowa, May 24-25. Secretary, L. E. Caldwell, Iowa City, Iowa.

Electric Power Club. Spring meeting, Homestead Hotel, Hot Springs, Va., June 11-14. Secretary, C. H. Roth, 1410 West Adams Street, Chicago, Ill.

Electrical Contractors' Association of Pennsylvania. Annual convention, Philadelphia, Pa., June 19-21. Secretary, M. J. Sellers, 1518 Sansom Street, Philadelphia, Pa.

American Institute of Chemical Engineers. Semi-annual meeting, Buffalo, N. Y., June 20-22. Secretary, J. C. Olsen, Cooper Union, New York City.

American Institute of Electrical Engineers. Annual meeting, Hot Springs, Va., June 26-29. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York City.

Ohio Electric Light Association. Annual convention, Breakers Hotel, Cedar Point, O., July 16-20. Secretary, D. L. Gaskill, Greenville, O.

## SOUTH CENTRAL STATES.

BUTLER, KY.—C. E. Record, who has obtained a 20-year franchise for furnishing electric service here, is completing plans for the erection of a power plant to cost about $5,000.

ELKHORN, KY.—M. Bolling and others plan to organize a company to construct an electric light and power plant here, to cost $15,000.

LAWRENCEBURG, TENN.—Extensions probably will be made to the local white-way system on North Military Street.

PULASKI, TENN.—The Board of Alderman has voted funds for the installation of an additional generator in the municipal plant.

BIRMINGHAM, ALA.—Plans have been completed for doubling the capacity of the Alabama Power Company's plant at Lock 17 on the Warrior River, and contracts involving $1,500,000 for this development have been awarded. This announcement has been made by General Manager W. N. Walmsley, who stated that the work of construction would be commenced at once.

FT. SMITH, ARK.—The Fort Smith Light & Traction Company has made surveys for a high-tension transmission line to Jenny Lind and Greenwood.

CARMEN, OKLA.—The city has voted $25,000 in bonds for the construction of an electric light and power plant.

OKEMAH, OKLA.—The city contemplates voting $20,000 bonds for improvements to the electric lighting plant. Plans are being prepared by Benham Engineering Company, Colcord Building, Oklahoma City.

SHAWNEE, OKLA.—The Municipal Power & Light Company has been incorporated with offices in this city, by Sinclair Mainland, of Oshkosh, Wis.; W. S. Arnold, of Chicago, Ill., and Edward Howe, of Shawnee. The capitalization is $3,000.

INDEPENDENCE HEIGHTS, TEX.—Citizens here are considering ways and means for the establishment of an electric light and power system.

KINGSVILLE, TEX.—In the issue of April 21 it was stated that the St. Louis, Brownsville & Mexico Railroad Company planned to install an electric power plant to operate its local shop equipment. This statement is erroneous, the fact being that the company recently installed a large amount of additional power equipment. Energy for the operation of the shop equipment is furnished by the Texas Gas & Electric Company, Houston, Tex., of which D. A. Hegarty is president.

BEAUMONT, TEX.—The City Council is considering franchise agreements in connection with the proposed purchase by the Jefferson County Traction Company of the properties of the Beaumont Electric Light & Power Company and the Beaumont Traction Company.

DALLAS, TEX.—Property owners of Mt. Auburn, a local suburb, have formed an improvement league and will endeavor to make the installation of a new street-lighting system.

DALLAS, TEX.—The Standard Utilities Construction Company has been incorporated here with a capital stock of $100,000 for the purpose of constructing an interurban electric railway from Dallas to Slidell, a distance of 48 miles. The route of the proposed line is through Denton and several smaller towns. The incorporators are M. W. Deavenport and H. Rowe, of Denton; Ira E. Cornelius, of Muskogee, Okla., and C. F. Hopkins, of Tulsa, Okla. The project also involves the construction of a large electric power station.

MARSHALL, TEX.—The plant of the Marshall Ice & Electric Company recently was damaged by fire, the loss being about $2,000.

PORT ARTHUR, TEX.—The Port Arthur Light & Power Company will install machinery in a new power station building that it is erecting here.

PORT ARTHUR, TEX.—The Beaumont & Port Arthur Traction Company, which is owned by the Stone & Webster Engineering Corporation, of Boston, Mass., will build a new interurban station here. It operates an interurban line between Beaumont and Port Arthur.

SAN ANGELO, TEX.—The Texas Electric Light & Power Company has been incorporated here with a capital stock of $200,000. It will take over and operate the local electric light and power plant and transmission system in this section. The power station will be enlarged and extensions made to the transmission system. The company will also build and operate the street-railway system here and construct an interurban line to Ballinger, a distance of about 30 miles. Charles W. Hobbs, of San Angelo, is president; R. J. Irvine, of San Antonio, vice-president, and M. F. Treadway, of Ballinger, secretary-treasurer.

SOUR LAKE, TEX.—The Sour Lake Ice, Light & Power Company has filed a certificate of dissolution with the secretary of state.

## WESTERN STATES.

LIVINGSTON, MONT.—The City Council has passed a resolution providing for the construction of an ornamental lighting system on certain streets, to cost about $8,800.

MOGOLLON, N. M.—Charles E. Stewart, of New York, has taken an option on the partly finished hydroelectric plant commenced by B. W. Hill and associates. Mr. Stewart proposes to finish the installation.

GLOBE, ARIZ.—The City Council has granted a franchise to E. Sultan for the construction of an interurban electric railway through the town. The proposed

road is to connect Globe and Miami and will cost about $250,000.

MESA, ARIZ.—A special election has been called for May 15 to vote on bonds in the sum of $125,000, to be used for the construction of an electric lighting system.

PHOENIX, ARIZ.—The Magna Copper Company will build a power plant, capable of generating 600 kilowatts, the power to be distributed among members of the Water Users' Association.

SALT LAKE CITY, UTAH.—Improvements aggregating nearly $900,000 will be made this spring and summer by the Beaver River Power Company and the Southern Utah Power Company on their power plants and transmission lines in Beaver and Sevier Counties. The power companies already have five power plants and about 150 miles of transmission lines in the southern counties supplying Beaver and Milford and numerous mines in the district. The power plants already in possession of the companies will be remodeled to increase their capacity and in addition a large plant will be built on the Beaver River. In addition to increasing the power in the districts they already supply, the power companies will extend their transmission lines to double their present length. A line will be built from Beaver to Marysvale for service at Marysvale and the Deer Trail mine. Another line will be built from Richfield to Fillmore for the service of the residents of Fillmore and a third line will be built from Frisco to the Qual metal mines.

WINNEMUCCA, NEV.—Survey for a high power electric line from Winnemucca to Goleonda and thence down Adalaide Valley to connect with the main power line being built from Rochester to Battle Mountain has been started by T. C. Johnson, engineer for the Nevada Valleys Power Company. The company intends to distribute energy for light and power throughout the Winnemucca section of Nevada.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company will construct a 55,000-volt power line from Fern Hill to Olympia, Wash., to cost $53,000, to connect with service wires of the Olympia Light & Power Company, which company will spend some $15,000 for the installation of new transformers.

SHELTON, WASH.—The Mason County Power Company, of which Frank McKean is manager, has applied to the County Commissioners for permission to use the roads of Mason County for the erection of a transmission line to connect with the hydroelectric plant on Skohomish River. Electric service will be furnished to municipalities in Kitsap County, Mason County and Shelton.

ARCADIA, CAL.—The Southern California Edison Company has received the contract for the installation of the new lighting system to be installed by the city of Arcadia.

FRESNO, CAL.—The San Joaquin Light & Power Corporation has applied to the California Railroad Commission for approval of an indenture securing $4,500,000 ten-year six-per-cent debentures, of which $1,000,000 are to be sold at once to reimburse the treasury for capital expenditures and for new improvements.

LOS ANGELES, CAL.—The Southern California Edison Company has applied for permission to buy the electric plant of the Beverly Hills Utilities Company.

LOS ANGELES, CAL.—Directors of the Pacific Electric Company have authorized the expenditure of $1,100,000 for the construction of the company's shops at Torrance.

LOS ANGELES, CAL.—The federal government has applied for the use of electricity generated at the Aqueduct Station No. 1 for the large nitric plant which is to be erected soon.

LOS ANGELES, CAL.—The City Council has passed an ordinance calling for the installation of an ornamental lighting system on Wilshire Boulevard, from Park View Street to Arden Boulevard, and on Park View Street from Sixth to Seventh Streets.

PASADENA, CAL.—The City Commission has passed an ordinance calling for the installation of an electric street-lighting system in Lester Avenue between Orange Grove Avenue and Rosella Drive.

RIALTO, CAL.—The Board of Trustees has granted a franchise to the Pacific Electric Company to maintain a street-railway system within the city.

SAN FRANCISCO, CAL.—The Great Western Power Company has applied for permission to build power lines and conduct business under the privileges granted it by Plumas County in all sections of the county except those parts now served by the Plumas Light & Power Company, the Quincy Electric Light & Power Company and the Grizzly Electric Company.

SUSIN, CAL.—The Vallejo Electric Light & Power Company has been granted a franchise in Selano County.

## PROPOSALS

ELECTRIC MAIL ELEVATOR.—Proposals will be opened in the Supervising Architect's Office, Treasury Department, Washington, D. C., May 15, for the installation complete of an electric mail elevator, etc., in the United States post office and courthouse at Philadelphia, Pa., in accordance with the drawing and specification, copies of which may be had at that office. James A. Wetmore, Acting Supervising Architect.

MOTOR-DRIVEN PUMPS.—Sealed bids will be received May 12 at the office of Robert W. Hunt & Company, 2200 Insurance Exchange Building, Chicago, Ill., for the furnishing of material and performance of work required in the alteration and enlargement of pumping plant at Winchester, Ill. Proposals must be for the complete work of removing part of the old machinery and building new foundations for the new machinery, and furnishing and erecting an extended pump shaft, two motors, one 30-inch pump, switchboard and wiring, suction and discharge pipe, two belts and such other work and material necessary for a complete working plant ready for operation on or before December 31. Roy S. Coon, Commissioner of Big Swan Drainage and Levee District, Winchester, Ill.

ELECTRICAL SUPPLIES.—Bids will be received at the Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., for furnishing supplies at the following naval Stations: Schedule 1029, Pensacola, Fla., 1,500 feet of double silk and single cotton wire; 230 feet of single-conductor, rubber-insulated, double-braided wire; 15,450 feet of single-conductor, paper-insulated, lead-covered cable; 5,005 feet of duplex, rubber-insulated, lead-covered cable; 10,400 feet of duplex, paper-insulated, lead-covered cable; 10,900 feet of three-conductor, paper-insulated, lead-covered cable; 2,850 feet of three-conductor, rubber-insulated, lead-covered cable. Schedule 1046, Brooklyn, N. Y., and Mare Island, Cal., miscellaneous electrical supplies, distribution boxes, junction boxes, switches, receptacles, etc. Bidders desiring to submit proposals should make application to the Bureau or to the nearest navy yard purchasing office.

## FINANCIAL NOTES

William P. Bonbright & Company have underwritten $1,800,000 six-per-cent secured notes of a new authorized issue of $2,000,000 of the West Virginia Traction & Electric Company. The proceeds will be used to retire the two-year, six-per-cent collateral gold notes of the company due June 1, 1917. It is expected that a public offering of the notes will be made in the near future.

A special meeting of the stockholders of the Havana Electric Railway, Light & Power Company will be held May 17 to vote on increasing the capital stock from $30,000,000 to $36,000,000 by the issue of $6,000,000 preferred stock, making the capital $15,000,000 common and $21,000,000 preferred. The annual meeting will be held on the same day.

The directors of the American Water Works & Electric Company have issued a plan for paying off the 21-per-cent dividend due on the first preferred stock and for beginning regular dividends on the shares next August. The plan provides that the holder of 100 shares of the first preferred shall receive $300 in cash, $900 par value of first preferred and

WEEKLY COMPARISON OF CLOSING BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

| | Div. rate per cent. | Bid Apr. 23. | Bid Apr. 30. |
|---|---|---|---|
| **Public utilities—** | | | |
| Adirondack Electric Power of Glens Falls, common | .. | 25 | 23½ |
| Adirondack Electric Power of Glens Falls, preferred | 6 | 80 | 78½ |
| American Gas & Electric of New York, common | 10+extra | 130 | 128 |
| American Gas & Electric of New York, preferred | 6 | 50 | 49½ |
| American Light & Traction of New York, common | .. | 324 | 330 |
| American Light & Traction of New York, preferred | 6 | 111 | 112 |
| American Power & Light of New York, common | 4 | 80 | 78 |
| American Power & Light of New York, preferred | 6 | 88 | 88½ |
| American Public Utilities of Grand Rapids, common | .. | 35 | 35 |
| American Public Utilities of Grand Rapids, preferred | 6 | 68 | 68 |
| American Telephone & Telegraph of New York | .. | 124 | 124 |
| American Water Works & Elec. of New York, common | .. | 10 | 9½ |
| American Water Works & Elec. of New York, particip. | 7 | 30 | 29 |
| American Water Works & Elec. of New York, first preferred | .. | 86 | 81 |
| Appalachian Power of Bluefield, common | .. | 6¼ | 5 |
| Appalachian Power of Bluefield, preferred | 7 | 35 | 35 |
| City Service of New York, common | 6+extra | 285 | 284 |
| City Service of New York, preferred | 6 | 87 | 84 |
| Commonwealth Edison of Chicago | 8 | 131 | 131 |
| Comm. Power, Railway & Light of Jackson, common | 4 | 54½ | 53 |
| Comm. Power, Railway & Light of Jackson, preferred | 6 | 79 | 76 |
| Federal Light & Traction of New York, common | .. | 12 | 11½ |
| Federal Light & Traction of New York, preferred | .. | 45 | 45 |
| Illinois Northern Utilities of Dixon | 6 | 80 | 81 |
| Middle West Utilities of Chicago, common | 2+2 extra | 54 | 53 |
| Middle West Utilities of Chicago, preferred | 6 | 75¼ | 71½ |
| Northern States Power of Chicago, common | 7 | 97 | 96 |
| Northern States Power of Chicago, preferred | 7 | 98½ | 98 |
| Pacific Gas & Electric of San Francisco, common | 5 | 60 | 60 |
| Pacific Gas & Electric of San Francisco, preferred | 6 | 91½ | 91½ |
| Public Service of Northern Illinois, Chicago, common | 7 | 104 | 103 |
| Public Service of Northern Illinois, Chicago, preferred | 6 | 98 | 99 |
| Republic Railway & Light of Youngstown, common | 4 | 35½ | 36½ |
| Republic Railway & Light of Youngstown, preferred | 6 | 67 | 67 |
| Standard Gas & Electric of Chicago, common | .. | 12 | 12 |
| Standard Gas & Electric of Chicago, preferred | 6 | 37 | 37 |
| Tennessee Railway, light & Power of Chattanooga, common | .. | 7 | 6½ |
| Tennessee Railway, light & Power of Chattanooga, preferred | 6 | 29 | 29 |
| United Light & Railways of Grand Rapids, common | 4 | 43 | 41 |
| United Light & Railways of Grand Rapids, preferred | 6 | 72 | 71 |
| Western Power of San Francisco, common | .. | 15 | 15 |
| Western Power of San Francisco, preferred | 6 | 54 | 54 |
| Western Union Telegraph of New York | 5+extra | 96 | 95½ |
| **Industrials—** | | | |
| Electric Storage Battery of Philadelphia, common | 4 | 62 | 61¼ |
| General Electric of Schenectady | 8 | 162 | 163¾ |
| National Carbon of Cleveland, common | 8 | *300 | *311 |
| National Carbon of Cleveland, preferred | 7 | *135 | *133 |
| Westinghouse Electric & Mfg. of Pittsburgh, common | 5+extra | 48 | 48¾ |
| Westinghouse Electric & Mfg. of Pittsburgh, preferred | 7 | 65 | *65 |

*Last sale.

$4,000 par value of common stock. The shareholders in order to carry out the plan will be asked to authorize an increase in the first preferred from $5,000,000 to $10,000,000.

The Illinois Public Utilities Commission has issued an order authorizing the American Telephone & Telegraph Company to purchase the new stock of the Chicago Telephone Company. Meanwhile the commission has asked the attorney-general of Illinois, whether the permission of the commission was necessary for the issuance of $900,000 bonds by the Public Service Company of Northern Illinois, and whether it was necessary for an issue of $558,000 in notes by the Chicago & Oak Park Railroad Company. The companies mentioned deny the jurisdiction of the state commission.

DAYTON POWER & LIGHT.

| | 1917. | 1916. |
|---|---|---|
| March gross earnings.... | $149,775 | $135,133 |
| Operating expense ..... | 110,166 | 71,385 |
| Net earnings ..... | 39,609 | 63,748 |
| Non-operating revenue... | 1,400 | 406 |
| Total income ..... | 41,009 | 64,154 |
| Interest on bonds..... | 15,124 | 15,213 |
| Other interest and sinking fund ..... | 9,750 | 1,680 |
| Total deductions ..... | 24,874 | 16,893 |
| Net income ..... | 16,135 | 47,261 |
| Dividend on preferred stock ..... | 14,813 | 14,813 |
| Surplus ..... | 1,322 | 32,448 |
| Operating ratio ..... | 73.55% | 52.83% |

## INCORPORATIONS

CHICAGO, ILL.—Gordon Electric & Manufacturing Company has increased its capital from $15,000 to $75,000.

CLEVELAND, O.—Perfection Trolley Company. Capital, $10,000. Incorporators: R. W. Winbush, William Duncan, James W. Brown, M. Lipford and S. W. Dunn.

LOGAN, UTAH.—Adams & Genter Sales Corporation. Capital, $5,000. Deal in electrical appliances. Incorporators: J. N. Adams, P. H. Genter and A. L. Genter.

CLEVELAND, O.—Sterling Electrical Corporation. Capital, $250,000. Incorporators: Roy M. Hall, W. H. Fahrenbach, Clarence E. Edson, P. Hess and A. Longoria.

LAFAYETTE, IND.—Randolph-Glenn-Koerner Electric Company. Capital, $10,000. Electrical contracting and repairs. Incorporators: William Koerner, James Glenn and W. C. Randolph.

BROOKLYN, N. Y.—Nobattery Light Company. Capital, $30,000. Manufacture non-battery flashlights. Incorporators: Albert Lazarowitz, Max Camora and Jacob Halperen, 470 Gates Avenue.

CLEVELAND, O.—Apex Electrical Distributing Company. Capital, $25,000. Deal in electrical appliances. Incorporators: W. T. Holliday, W. A. McAfee, R. P. Cunningham, H. E. Brothers and A. M. Pejeau.

NEW YORK, N. Y.—Lanton Adams Electric Company. Capital, $10,000. Manufacture electrical machinery. Incorporators: R. A. Lan, E. Schuster and S. Hess, 315 West Ninety-fourth Street, New York.

PHILADELPHIA, PA.—Automatic Electric Crossing Gate Company. Capital $500,000. To manufacture electric safety devices for railroads. Incorporators: F. R. Hansell, George H. B. Martin and S. C. Seymour.

NEW YORK, N. Y.—Waterlite Power & Engineering Company. Nominal capital, $8,500. To manufacture electric lighting appliances, motors, etc. Incorporators: A. W. Cubby, H. L. Shartle and G. R. Bennett, 183 Madison Street, Brooklyn.

HASTINGS-ON-HUDSON, N. Y.—National Conduit & Cable Company. Capital, $750,000. Manufacture wires, cables, insulating materials, etc. Incorporators: Percy S. Williams, 538 Seventy-third Street, Brooklyn; J. W. Rhoades, 530 West 113th Street, New York City, and Thomas M. Malone, 404½ Henry Street, Brooklyn.

# Electrical Patents Issued April 24, 1917

**Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.**

**1,223,357. Composite Titanic-Oxid Pigment and Method for Producing the Same** L. E. Barton, assignor to Titanium Alloy Mfg. Co., New York, N. Y. Electrolytic treatment of titanic sulfate solution to precipitate sulfate in contact with suspended particles of titanic oxid.

**1,223,358. Method for Producing Basic Titanic-Sulfate Products and Pure Titanic Oxid Therefrom.** L. E. Barton, assignor to Titanium Alloy Mfg. Co. Electrolytic precipitation of basic titanic sulfate from titanic sulfate solution.

**1,223,369. Telephone System.** E. E. Clement, assignor to J. R. Garfield, Cleveland, O. Cord circuits have manual plugs at one end and traveling switches for connecting other ends.

**1,223,375. Electrical Toy.** G. S. Elliott, Needles, Cal. Structure of motor having rotating armature operated by electromagnets.

**1,223,376. Wireless Receiving System.** L. Espenschied, assignor to American Telephone & Telegraph Co., New York, N. Y. Combination of circuits connected with main and auxiliary antennae, including amplifiers and vacuum-tube detectors.

**1,223,377. Method of and Apparatus for Testing Magnetic Objects.** F. P. Fahy, Washington, D. C. For determining the effect of heat treatment of magnetic metals.

**1,223,378. Switch-Block and Casing.** A. L. Fromager and J. F. Six, Montreal, Quebec. Structure of switch and fuse device.

**1,223,382. Locking Mechanism for Impulse-Transmitters.** C. L. Goodrum, assignor to Western Electric Co., New York, N. Y. For automatic telephone systems.

**1,223,384. Printing Mechanism for Meters.** C. I. Hall, assignor to Chicago Electric Meter Co., Chicago, Ill. Has electromagnetically operated printing and tape-feeding mechanism.

**1,223,400. Power-Transmission Mechanism.** C. B. Kurtz, Lakewood, O. Dynamoelectric.

**1,223,413. Signaling System.** C. P. Nachod, Philadelphia, Pa., assignor to Nachod Signal Co. Railway block system.

**1,223,414. Pneumatic-Despatch-Tube Apparatus.** J. T. Needham, assignor to Lamson Co., Newark, N. J. Has automatic electric control of exhausting apparatus.

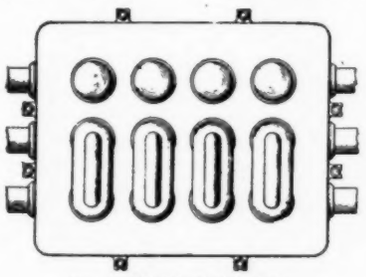
**1,223,417. Socket.** H. G. Pape, assignor to R. A. Schoenberg, New York, N. Y. For lamps; structure of shell and switch.

**1,223,428. Vapor Alternating-Current Rectifier and Similar Apparatus.** B. Schaefer, assignor to Hartmann & Braun A. G., Frankfort-on-the-Main, Germany. Arrangement of anodes and cooling members in a metal container.

**1,223,434. Manufacture of Electric Cables.** W. F. Smith, assignor to Western Electric Co. Method of forming a twisted pair of insulated conductors.

**1,223,436. Speed Changing and Controlling Device.** A. Spear, deceased; M. B. Spear, executrix, Brooklyn, N. Y. Special control of electromagnetic gear-shifts.

**1,223,437. Protective System.** J. B. Speed, assignor to Western Electric Co.



No. 1,223,750—Cable-Box.

Switch short-circuiting inductance linked with lead is blown open by detonating device on rush of current in lead.

**1,223,444. Joint for Electric Cables.** A. E. Tanner, Stretford, and E. A. Claremont, High Leigh, England. Arrangement of conductors in a tubular sleeve.

**1,223,449. Dynamoelectric Machine.** W. A. Turbayne, assignor to U. S. Light & Heat Corp., Niagara Falls, N. Y. Ring-wound armature has special arrangement of field poles within and without to counteract armature reaction.

**1,223,459. Means for Producing Colored-Light Effects.** G. C. Whitney, New York, N. Y. Electric signal in which lights of two or more colors are projected through a signal lens.

**1,223,463. Printing-Telegraph.** J. E. Wright, New York, N. Y. Type-wheel is operated by impulse-controlled permutation elements.

**1,223,467. Means for Attaching Electrical Appliances to Conduit Outlet-Boxes.** C. H. Bissell, assignor to Crouse-Hinds Co., Syracuse, N. Y. Structural details.

**1,223,470. Current-Transforming Device.** A. R. Bullock, assignor to H. C. Lee, trustee, Los Angeles, Cal. Commutator apparatus for rectifying current.

**1,223,471. Apparatus for Charging Storage Batteries.** A. R. Bullock, assignor to H. C. Lee. Manner of utilizing pulsating current obtained by rectifying alternating current.

**1,223,472. Method of Running a Synchronous Motor.** A. R. Bullock, assignor to Erie Coil Co., Cleveland, O. Motor is run with fields excited just sufficiently to keep it from falling out of step regardless of power factor.

**1,223,473. Current-Converting Device.** A. R. Bullock, Cleveland, O. Arrangement of reactance coils and condensers for treating a pulsating current.

**1,223,475. Calcining-Furnace.** W. R. Clymer, assignor to National Carbon Co. Structure of electric furnace.

**1,223,481. Factory Fire-Drill System.** D. G. Dee, assignor to R. H. Rogers, Rochester, N. Y. Electric alarm system.

**1,223,496. Electrostatic Telephone System.** I. Langmuir, assignor to General Electric Co. Arrangement of system comprising a condenser transmitter and an electron discharge device.

**1,223,506. Common-Battery Automatic Telephone System.** T. G. Martin, assignor to Automatic Electric Co. Detailed circuit arrangements.

**1,223,511. Signaling System.** C. P. Nachod, assignor to Nachod Signal Co. For elevators.

**1,223,527. Signal Device for Elevator Systems.** C. D. Seeberger, New York, N. Y. Warns when pair of cars in same shaft approach within certain distance.

**1,223,530. Automatic Electric Controller.** B. W. Sweet, assignor to Van Dorn Electric Tool Co., Cleveland, O. Structural details of automatic electromagnetic switch.

**1,223,532. Lamp-Hanger.** A. J. Thompson, Cleveland, O. For raising and lowering, with contacts between the movable parts permitting universal movement when in engagement.

**1,223,545. Acoustic Device.** R. Whitman, Mount Vernon, N. Y. Attachment for telephone receiver for lowering and softening the tone of sounds without reducing their force.

**1,223,611. Release-Lock for Switches.** E. K. Post and J. S. Gensheimer, Altoona, Pa. For railway track switches; electrically controlled by traffic conditions.

**1,223,614. Embossing Attachment for Printing-Presses.** F. W. Reed, South Bend, Ind. Die-supporting block is electrically heated.

**1,223,623. Fuse Device.** E. O. Schweitzer and N. J. Conrad, assignors to Schweitzer & Conrad, Chicago, Ill. In-

closed fuse with cork casing, has spring-separated terminals, a fuse-reinforcing wire and arc-extinguishing fluid.

**1,223,657. Automobile Headlight.** J. C. Backus, Smethport, Pa. Arrangement of tilting and turning reflector elements.

**1,223,549. Circuit-Protecting Apparatus.** J. G. Zimmerman, assignor to Allis-Chalmers Mfg. Co. Circuit-breaker is controlled by action of current on a liquid column.

**1,223,562. Telephone Arm-Rest.** M. Clemence, Kansas City, Mo. Structure of bracket, etc.

**1,223,589. Signaling Device.** A. J. Kloneck, New York, N. Y. Consists of a receptacle containing two arcing electrodes, an incandescent means and a blow-out coil.

**1,223,669. Electrical Heating Attachment for Soldering Irons.** J. G. Clemens, Buffalo, N. Y. Manner of mounting iron contacting carbons on shank of iron.

**1,223,673. Adjustable Motor-Bracket for Electric Washers.** O. R. Corey, Fairfield, Iowa. Structural details.

**1,223,685. Permissive Automatic Train-Stop.** A. H. Fox, New York, and A. W. Lenperoth, Stapleton, N. Y. Speed and manual controlled.

**1,223,686. Device for Recording the Readings of Meters.** A. Frisch, assignor to A. Frisch & Co., Zurich, Switzerland. Photographs of the indicators are automatically taken at certain times.

**1,223,699. Conduit-Threader.** S. Kamowski, Nanticoke, Pa. For drawing in conduit.

**1,223,704. Electric Generator.** L. J. LePontois, assignor to Teagle Co., Cleveland, O. Magneto of inductor type, for ignition circuits.

**1,223,729. Electric Water-Heater.** F. C. Perkins, Buffalo, N. Y., assignor one-eighth to G. J. Meyer, one-eighth to G. H. Meyer, one-eighth to L. P. Meyer and one-eighth to E. Meyer, Buffalo, N. Y. Arrangement of water coil and steam and water tank for passing current through the water.

**1,223,737. Dirigible Lamp and Direction-Indicator.** F. M. Ross and H. L. Cook, Cincinnati, O. Structural details of rotary bracket and operating mechanism.

**1,223,750. Cable-Box.** A. A. Wakefield, assignor to G. & W. Electric Specialty Co., Chicago, Ill. Has parallel cables entering and leaving, with provision for introducing conductors to be connected with the cable strands. (See cut.)

**1,223,752. Apparatus for Reflecting Light-Rays.** A. H. Adams, assignor to Western Electric Co. Reflector arrangement secured to socket plug for projecting substantially all the lamp rays on a limited area.

**1,223,771. Moving-Picture Operator's Automatic Signaling Device.** O. B. Day, Greencastle, Ind. Alarm circuit is closed by foil strip on film-contacting rollers.

**1,223,778. Controlling Mechanism for Clock-Movements.** L. Ericson, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Motor-driven clock-train has balance wheel controlled by electromagnet.

**1,223,789. Burglar-Alarm System.** S. B. Hess, New York, N. Y. Arrangement of door-controlled circuits.

**1,223,791. Lineman's Device.** V. Jackson, assignor to San Diego Consolidated Gas & Electric Co., San Diego, Cal. For making connection to live, high-potential line wire.

**1,223,799. Liquid-Level Indicator for Steam-Boilers.** W. A. Kitts, Sr., assignor to Kitts Steam Specialty Co., Oswego, N. Y. Has special structure of float mechanism controlling alarm circuit.

**1,223,865. Electric Conduit Fitting.** D. C. Gidley, assignor to Crouse-Hinds Co., Syracuse, N. Y. Is specially fitted with a socket for attaching an electric appliance.

**1,223,866. Circuit-Closer for Automatic Train-Stops.** C. J. Graham and J. A. Farris, Chicago. Contacts are held apart by frangible glass bulb.

**1,223,869. Hand-Lamp.** C. Hambuechen, assignor to American Carbon & Battery Co., East St. Louis, Ill. Details of tubular flashlight.

**1,223,876. Motor and Support for Display-Forms and the Like.** M. A. Heimann, St. Louis, Mo. Details of mechanism for driving a rotary table.

**1,223,881. Electrical Insulation.** W. A. Ishler, assignor to General Electric Co. An insulating barrier having an oil-soaked absorbent sheet, a sheet of fire-resistant material on each side of it, and the whole inclosed in an impervious wrapping.

**1,223,883. Portable Electric Lamp.** L. F. James and R. F. James, New York, N. Y. Structure of tubular flashlight.

**1,223,909. Disk Strain-Insulator.** L. Steinberger, Brooklyn, N. Y. Has special creepage paths. (See cut.)

**1,223,916. Lightning Arrester.** F. B. Wiegand, assignor to National Electric Specialty Co., Toledo, O. Special unitary structure comprising gap electrodes and blow-out magnet.

**1,223,921. Lamp-Changing Device.** A. Zeisel, assignor to Zeisel Electric Co., Bel Air, Md. Structure of lamp-grip for pole-end.

**1,223,924. Power-Transmitting Mechanism.** E. F. W. Alexanderson, assignor to General Electric Company. For connecting concentrically arranged motor with car-axle.

**1,223,925. Electric Control for Automobiles.** C. S. Altschul, Fort Wayne, Ind. Arrangement of switches and conductors on steering post.

**1,223,937. Telephone System.** H. P. Clausen, assignor to Western Electric Co. Circuit and signal arrangement for system having main and sub-exchanges.

**1,223,947. Induction-Coil.** C. A. Ferrell, assignor of one-half to H. E. Page, Cleveland, O. Secondary layers are separated by insulation of low specific inductive capacity and free terminals are separated from remainder of coil by insulation of higher specific inductive capacity.

**1,223,958. Metallic-Filament Incandescent Electric Lamp.** E. Geisel, assignor to General Electric Co. Structure of filament support.

**1,223,968. Electric Car-Heater.** W. S. Hammond, Jr., assignor to Consolidated Car-Heating Co., Albany, N. Y. Structure of casing and arrangement of heaters therein, with special reference to air circulation.

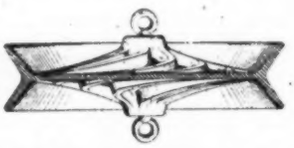
**1,223,971. Distilled-Water Bottle and Storage-Battery Filler.** R. W. Harvey, Lynchburg, Va. Syringe is selectively mounted in cover and carries an index co-operating with index on cover.

**1,223,981. Automobile Signaling Device.** A. W. Johnson, Portland, Ore. Direction indicator for attachment to wind shield.

**1,223,986. Electrode and Coating Therefor.** J. C. King, Montreal, Quebec. For electric furnaces; coating is of fire-clay and graphite.

**1,223,987. Cutout for Series Loops.** W. A. Kirkland, Cedar Falls, Iowa. Structural details.

**1,224,022. Automobile Signal.** A. P. Rothermich, St. Louis, Mo. Structural



**No. 1,223,909—Disk Strain Insulator.**

details of rotatable casing with interior light.

**1,224,030. Water-Tight Lamp Socket.** S. B. Smith, St. John, New Brunswick, assignor of one-half to L. S. Benjamin. Socket has a water-tight sleeve closely embracing the lamp base.

**1,224,037. Electric Sign.** S. E. Swancutt, Stevens Point, Wis. Arrangement of reflectors and sliding lamp socket in casing.

**1,224,048. Method for Producing Electrical Oscillations of High Frequency from Direct Current.** E. von Lepel, Berlin-Wilmersdorf, Germany. Special arrangement of condensers and tuning means.

**1,224,064. Lamp for Motor-Vehicles.** R. E. Booraem, Denver, Colo. Flashlight for signaling front and rear is secured to exterior of casing of illuminating lamp.

**1,224,072. Signal-Box Having Local Alarm.** F. W. Cole, assignor to Gamewell Fire Alarm Telegraph Co., New York, N. Y. Local alarm circuit is interlocked with bolt of signal box.

**1,224,097. Lamp Support.** E. M. Rosenbluth, Philadelphia, Pa. Details of casing and holder for incandescent lamp therein.

**1,224,099. Signaling System for Sprinkler Systems.** N. H. Suren, assignor to Gamewell Fire Alarm Telegraph Co., New York, N. Y. Check valve between service and supply pipes, and pressure gauge in former control signal mechanism to selectively send code signals.

**1,224,111. Switch Indicator.** S. N. Wight, assignor to General Railway Signal Co., Gates, N. Y. Railway signal system indicating position of track switches.

**1,224,116. Electric Switch.** R. O. W. Lundin, assignor to Trumbull Mfg. Co., Plainville, Conn. Two-push-button, snap.

**1,224,117. Electric Water-Heater.** S. D. Nesmith, La Jolla, Cal. Comprises a casing containing a body of moulded insulation having flat water channels and conductors embedded therein.

**1,224,118. Fuse-Box.** R. Ratcliffe, assignor to Trumbull Electric Mfg. Co. Cover has slot over fuse and slide for closing the slot which is locked in open or closed position, as it may be, when the cover is closed.

**1,224,119. Safety-Switch.** A. K. Sutherland, assignor to Trumbull Electric Mfg. Co. Operating handle in cover of casing can operate switch when cover is closed.

**1,224,122. Storage-Battery Locomotive.** R. Mancha, St. Louis, Mo. Structure of truck frame.

**1,224,123. Spark-Plug.** W. E. Sherbondy, Cleveland, O. Structural details.

## PATENTS EXPIRED.

The following United States electrical patents expired on May 1, 1917:

648,378. System of Electrical Distribution. Oskar Behrend, Frankfort-on-the Main, Germany.

648,388. Voltage Regulator. W. H. Chapman, Portland, Me.

648,410. Elevator. J. M. Howard, Chicago, Ill.

648,432. Railway Signal. S. C. Prentiss, Detroit, Mich.

648,446. Electromagnetic Coil. R. Varley, Jersey City, N. J.

648,481. Electrical Resistance. A. W. Berresford, Westfield, N. J.

648,487. Electric Clock. W. J. Dudley, Somerville, Mass.

648,489. System of Distribution. W. L. R. Emmet, Schenectady, N. Y.

648,492. Thermoelectric Generator. J. W. Harrison, Pueblo, Colo.

648,493 and 648,494. Regulating Dynamoelectric Machines. E. M. Hewlett, Schenectady, N. Y.

648,501. Apparatus for Supporting Overground Wires. C. J. Kronenberg, Auiderhohe, Germany.

648,505. Electric Fishing Apparatus. I. W. J. Lindbohm, Helsingfors, Russia.

648,516. Electric Lamp with Burner of the Second Class. K. Ochs, Berlin, Germany.

648,517. Electric Glow Light with Illuminating Body of Second-Class Conductor. K. Ochs, Berlin, Germany.

648,518. Electrical Resistance. K. Ochs, Berlin, Germany.

648,520. Circuit-Breaker for Gas Engines. J. A. Ostenberg, Westminster, Vt.

648,529. Dynamoelectric Machine. E. W. Robinson, Schenectady, N. Y.

648,533. Connection Counter for Telephone Lines. C. E. Scribner, Chicago, Ill.

648,543. Electrical Attachment for Hydrocarbon or Other Burners. F. Wilke, Akron, O.

648,546. Electrical Measuring Instrument. J. F. Begole, St. Louis, Mo.

648,555. Electric Switch. W. Ely, Providence, R. I.

648,599. Street-Car Fender. A. W. Shank, Detroit, Mich.

648,617. Electromagnetic Automatic Weighing Machine. G. Hoepner, Chicago, Ill.

648,625. Electric Arc Lamp. H. V. James, Salford, England.

648,636. Means for Operating Switches in Electric Tramways. A. G. Sharrow, Philadelphia, Pa.

648,647. Latch-Drop Device for Telephone Switchboards. E. E. Yaxley and C. C. Cadden, Chicago, Ill.

648,655. Apparatus for Removing Deposit of Carbon from Incandescent Electric Light Bulbs. E. W. Cushing, Middleton, Mass.

648,659. Phonographic-Telephonic Announcer. J. E. Evard, Indianapolis, Ind.

648,660. X-Ray Apparatus. R. A. Fessenden, Allegheny, Pa.

648,671. Switch for Electric Circuits. J. T. Robb, New York, N. Y.

648,673. Electrical Apparatus for Surgeon's Use. H. Schlesinger, New York, N. Y.

648,689. Igniting Device for Gas Engines. L. Hutchinson, Cambridge, Mass.

648,696. Method of Controlling Electric Motors. M. T. A. Kubierschky, Berlin, Germany.

648,731. Apparatus for Electrically Lighting Lamps. H. C. Farquharson, New York, N. Y.

648,764. Apparatus for Producing Ozone by Electricity. J. H. Lamprey, London, England.

648,786. Vapor-Burning Apparatus and System. E. Phillipson, H. M. Baker, Jr., and W. S. Sabel, New York, N. Y.